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NATIONAL TUBERCULOSIS ASSOCIATION

FIFTEENTH ANNUAL MEETING

ATLANTIC CITY, N. J.

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NATIONAL TUBERCULOSIS ASSOCIATION

NATIONAL TUBERCULOSIS ASSOCIATION

TRANSACTIONS OF THE FIFTEENTH ANNUAL MEETING

ATLANTIC CITY, N. J., JUNE 14, 16 AND 17, 1919

NATIONAL TUBERCULOSIS ASSOCIATION
381 FOURTH AVENUE
NEW YORK

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1918–1919

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FIFTEENTH ANNUAL MEETING

OF THE

National Tuberculosis Association

THE fifteenth annual meeting of the National Tuberculosis Association was held at St. Paul's Methodist Episcopal Church, Atlantic City, N. J., on Saturday, Monday and Tuesday, June 14, 16 and 17, 1919.

The meeting of the Association was called to order by the President, Dr. David R. Lyman, at 4.30 o'clock on Saturday. The address of the President was presented and filed for publication in the Transactions. The report of the Executive Office for the year ending May 31, 1919, was read and ordered filed.

The report of the committee previously appointed, Dr. James Alexander Miller, Chairman, to nominate candidates for vacancies on the Board of Directors was presented and it was moved and carried that the report of the committee be accepted and that the names be forwarded for formal election to Portland, Me., where the corporate meeting was held on Monday, June 16, at 10 A. M., and the following directors were duly and legally elected for terms of five years each unless otherwise indicated:

Dr. John S. Billings, New York, N. Y.
Dr. Charles V. Chapin, Providence, R. I.
Dr. Gordon K. Dickinson, Jersey City, N. J.
Dr. W. L. Dunn, Asheville, N. C.
Dr. Lee K. Frankel, New York, N. Y.
Dr. Paul A. Lewis, Philadelphia, Pa.
Dr. Harry T. Marshall, University, Va.
Dr. John H. Peck, Des Moines, Ia.
Mr. James H. Pershing, Denver, Colo.
Mr. Fred M. Stein, New York, N. Y.
Dr. Walter R. Steiner, Hartford, Conn.
Dr. Josephine Milligan, Jackson, Ill., (four years in place of Mr. Isaac Adler)
Mr. Henry B. Platt, New York, N. Y., (one year in place of Dr. O. W. McMichael)
Dr. Z. T. Scott, Austin, Texas (three years in place of Dr. John H. Lowman)

On motion duly made and carried, the following Committee on Resolutions was appointed by the Chairman:

Dr. Vincent Y. Bowditch, *Chairman*, Boston
Dr. Christen Quevli, Tacoma
Dr. G. W. Holden, Denver
Dr. Horace J. Howk, Mt. McGregor, N. Y.
Mr. Seymour H. Stone, Boston.

The meeting was well attended, the registration totaling 608, with representatives from every state in the Union and from Canada and England and other foreign countries.

Three sessions of the Clinical Section were held, three of the Pathological, three of the Sociological, one of the Nursing Section and one of the Advisory Council.

The announcement was made by the chair that Mr. Henry B. Platt of New York, one of the newly elected directors, had consented to serve as Treasurer of the Association, succeeding Mr. William H. Baldwin, resigned after ten years of service.

On behalf of the Committee on Resolutions, Dr. Vincent Y. Bowditch, Chairman, presented the following resolutions with the endorsement of the committee. Each of the resolutions was adopted unanimously:

1. Daylight Saving

WHEREAS, The National Tuberculosis Association has always advocated a maximum amount of sunlight and fresh air as a means of prevention and cure of tuberculosis, and

WHEREAS, The said Association considers the present daylight-saving law an aid in preserving the general health of the country, and in particular, a help in the prevention of tuberculosis, be it

Resolved, That the National Tuberculosis Association views with concern the present effort to abrogate the daylight-saving law, and hereby protests against any effort that shall tend to stop the operation of that law.

2. Universal Military Service

Be it Resolved, That the National Tuberculosis Association through its executive officers take immediate steps to secure the coöperation of all other great health organizations, especially the American Medical Association and state and territorial health officers in placing before the American people a united demand for the adoption of universal military service as a public health measure.

3. Coöperation with National Physical Education Service

WHEREAS, The introduction of physical education into the schools, including instruction in health principles, direction in physical activities, and periodic physical examinations, is of vital importance in the prevention and combating of tuberculosis, and

WHEREAS, The National Physical Education Service has been established for the purpose of unifying the efforts of all interested organizations for the promotion of a physical education in the elementary and secondary schools, therefore

Be it Resolved, That the National Tuberculosis Association will coöperate in every practicable way with the National Physical Education Service in the promotion of physical education in the schools.

4. Division of Tuberculosis

WHEREAS, It has become increasingly apparent that a Division of Tuberculosis of the United States Public Health Service is necessary and that the creation of such a division will be the greatest step forward in the struggle against this disease which it is possible to take at the present time, be it

Resolved, That the National Tuberculosis Association earnestly urges Congress to pass as promptly as possible the Ransdell-Esch bill (S. 1660, H. R. 3855) to provide such a Division of Tuberculosis in, and Advisory Council for, the United States Public Health Service.

5. Appreciation for Local Arrangements

Resolved, That a vote of thanks be given to the members of the St. Paul's Methodist Episcopal Church and to their pastor, Rev. A. A. Lucas; to the Local Committee of Arrangements, and the Committee on Registration for their splendid coöperation and assistance during this conference; and to Mr. Boyer, the Superintendent of Schools, for the use of the High School Auditorium.

On behalf of the Committee on Indigent Migratory Consumptives, Mr. James H. Pershing, Chairman, presented the following report, which was ordered accepted and placed on file:

Report of the Committee on Indigent Migratory Consumptives

In certain portions of the country, particularly the Southwest, the people are greatly concerned with the problem of the indigent migratory consumptive. This region is relatively sparsely populated and undeveloped. Therefore, the burden of indigence is sustained with difficulty. Besides, there has existed the feeling that with life in the arid regions, tuberculosis is not a concomitant, but is the product of less salubrious climates which is being shifted upon a people who are not responsible for its existence. The results are manifest. Not only is the migratory consumptive neglected, but the people of the arid regions fail to promote their own proper well-being by reason of the fear that by so doing they will be unduly burdened with responsibilities which belong to others.

Recognizing this situation, the National Tuberculosis Association, in December last, appointed a committee "to make a study of the problem of the indigent migratory consumptive in all of its various aspects and to outline and prepare a plan for dealing with the problem."

The present members of the committee are the following:

Mr. James H. Pershing, Chairman, Denver, Colo.
Mr. William H. Baldwin, Washington, D. C.
Dr. Philip King Brown, San Francisco, Calif.
Dr. S. J. Crumbine, Topeka, Kans.
Mr. E. K. Gaylord, Oklahoma City, Okla.
Mr. John M. Glenn, New York City
Dr. B. J. Lloyd, Hygienic Laboratory, U. S. Public Health Service, Washington, D. C.
Dr. Z. T. Scott, Austin, Tex.
Mr. E. C. Shaw, Akron, Ohio
Dr. A. G. Shortle, Albuquerque, N. Mex.
Mrs. E. L. M. Tate-Thompson, Los Angeles, Calif.
Miss Gertrude Vaile, Denver, Colo.
Dr. Allen Hamilton Williams, Phoenix, Ariz.

Dr. Severance Burrage, who in 1918 served as special public health investigator in Serbia with the Red Cross and more recently on the staff of the United States Public Health Service, was appointed by the National Association as the executive secretary for the committee, with an office at 519 Chamber of Commerce Building, Denver, Colorado.

The committee met for organization at Santa Fe, New Mexico, on March 1, 1919. It appeared to the committee that the subject before it naturally solved itself into three branches:

1. The prevention of migration;
2. The measures to be taken for the relief of communities into which indigent consumptives most generally migrate; and
3. The relief of migrating indigent consumptives.

The matter of prevention resolves itself largely into a question of education along three lines:

(*a*) Early diagnosis by the attending physician;
(*b*) Knowledge on the part of physician and patient that successful home treatment is possible; and
(*c*) General diffusion of knowledge with respect to (*a*) and (*b*)

The committee has suggested to the National Association the adoption of an education program involving the following:

(*a*) The securing for the control of tuberculosis emphasis and publicity by the Federal Government similar to that given to the control of venereal diseases.
(*b*) Assistance from the Federal Government directed to the medical profession by supplying information in aid of early diagnosis and home treatment.
(*c*) The exertion of influence which may lead to the adequate financing of the Public Health Service through the appropriate Federal Department and by means of appeals to such large private endowments as the Rockefeller Foundation.

The committee also urges the creation of a special department of tuberculosis in the Federal Public Health Service.

Since March 1 Dr. Burrage, the committee's secretary, has been making an intensive study of the problem throughout the Southwest and on the Pacific Coast. Dr. Burrage has not as yet completed his investigation, but in due course, will report his findings to the committee, which will, in turn, report to the National Association.

In view of the unfinished condition of the committee's investigations, it is impossible at this time to state conclusions. The data at hand, however, indicate, first, that the number of indigent consumptives who seek relief by change of climate is not as great as the committee had been led to believe; and second, that the number has been decreasing, at least during the period of the war. The problem has been complicated somewhat by the tuberculous soldier, a condition which may be expected to improve as the relief agencies provided by the Federal Government become better established.

In general it may be said that throughout the Southwest there is great want of public health legislation and no adequate enforcement of such laws as do exist. Aside from the fear of the burden of indigence, public opinion does not seem to be awake to the fact that there is a tuberculosis problem,—California is the only resort state which is making community provision for the care of its resident patients. The Colorado legislation, recently adjourned, refused to adopt a measure before it for the reorganization of its State Board of Health; but in this connection it should be said that the New Mexico Legislature created a Board of Health. Denver, at the municipal election of May 20, defeated a proposed bond issue to provide a municipal sanatorium for the tuberculous. Undoubtedly the fear that such an institution would increase the influx of indigent consumptives was an influence against its establishment.

The committee hopes to complete its work by September 1.

At a meeting of the Board of Directors the following officers were elected for the ensuing year:

Dr. Victor C. Vaughan, Michigan, President
Sir William Osler, England, Honorary Vice-President
Col. G. E. Bushnell, District of Columbia, Honorary Vice-President
Dr. Gerald B. Webb, Colorado, Vice-President
John M. Glenn, New York, Vice-President
Dr. Henry Barton Jacobs, Maryland, Secretary
Mr. Henry B. Platt, New York, Treasurer

The following directors were elected to serve on the Executive Committee for the ensuing year:

Dr. E. R. Baldwin, New York
Dr. George T. Palmer, Illinois
Dr. William Charles White, Pennsylvania
Dr. Vincent Y. Bowditch, Massachusetts
Dr. George M. Kober, District of Columbia
Dr. Hoyt E. Dearholt, Wisconsin
Mr. William H. Baldwin, District of Columbia

REPORT OF THE TREASURER

National Tuberculosis Association,
No. 381 Fourth Avenue, New York.

Gentlemen:

We have made an audit of the treasurer's cash account and books that enter in connection therewith for the period of May 1, 1918 to April 30, 1919. We have also checked all accounts in your general ledger and from it and additional data obtained in your office we have prepared and submit herewith:

Balance, May 1, 1918	$9,660.98
Receipts	1,635,324.63
Total	$1,644,985.61
Disbursements	1,188,978.34
Balance April 30, 1919	$456,007.27

We have reconciled the account with the American Security & Trust Company and with statement made by your Washington Bank as to the amount of your credit in this bank on April 30. The Corn Exchange Bank account (Executive Office Fund) was reconciled with the bank statement sent us, petty cash was counted and found correct.

GUNN RICHARDS & COMPANY.

Classified Statement of Cash Receipts and Disbursements from May 1, 1918 to April 30, 1919:

RECEIPTS

Balance May 1, 1918		$9,660.98
Accounts Receivable	$11,232.09	
Dues	12,208.33	
Donations	1,567.30	
Tuberculosis War Fund	304.74	
Red Cross Seal Sale 1917	46,925.22	
Suspense Account Refund	300.00	
Interest	3,295.44	
Red Cross Roll Call	1,500,000.00	
Salary Refunds	850.00	
American Review of Tuberculosis	1,894.00	
Modern Health Crusade	50,863.15	
Traveling Expense Refunds	557.59	
Postage Refunds	511.40	
Miscellaneous Refunds	491.69	
Petty Cash Suspense Refund	350.00	
Purchases for Resale	3,962.65	
Refunds Red Cross Roll Call	5.63	
Regular Printing Refunds	2.25	
Overpayments	3.15	
		1,635,324.63
Total Receipts		$1,644,985.61

DISBURSEMENTS

Salaries	$50,345.85
Publicity	2,109.33
American Review	7,452.35
Regular Printing	11,093.12
Traveling Expense	15,046.16
Postage	5,506.17
Miscellaneous	23,366.96
Red Cross Seal Campaign 1918	3,867.95
Red Cross Seal Supplies	3,860.65
Red Cross Seal Campaign 1919	187.47
Purchases for Resale	10,778.44
Suspense Account	2,000.00

Tuberculosis War Fund	832.82	
Modern Health Crusade	71,110.77	
War Program	1,012.87	
Conference Meetings	233.14	
Missionary Fund	19,500.00	
Civic Educational Loan Service	1,059.07	
State Associations	956,734.77	
Membership Campaign	2,160.74	
Civic Educational War Fund	78.10	
Army Hospital Fund	141.61	
Executive Office Fund	500.00	
Total Disbursements		$1,188,978.34

Balance May 1, 1918	$9,660.98
Receipts	1,635,324.63
Total Receipts	$ 1,644,985.61
Total Disbursements	1,188,978.34
Balance April 30, 1919	$456,007.27

Contributors to the funds of the Association for the year May 1, 1918 to April 30, 1919 were:

Mrs. Armen
John W. Auchincloss
Wm. P. Bancroft
A. R. Barnes
Miss Elizabeth S. Bonham
Mrs. E. M. Bunting
Mrs. Herbert Du Puy
Dr. Frederick K. Ehlers
Mr. Arthur B. Emmons
Mrs. Stephen V. Harkness
J. C. Havemeyer
A. H. Hawhurst
Mrs. Augusta G. Hazard
A. H. Herschel
T. J. Hillard
Mrs. Louis C. Madeira
Mr. F. Neilson
H. S.
Mrs. Edward M. Shuster
Mrs. Mabel Greeley Smith
C. L. Snowden
V. Worthington

ADDRESS OF THE PRESIDENT

THE RELATIONSHIP OF THE STATE AND NATIONAL ASSOCIATION TO THE OTHER AGENCIES IN THE TUBERCULOSIS CAMPAIGN

By DAVID R. LYMAN, M.D.
Wallingford, Conn.

I am often reminded nowadays of the story of the party where a prize was offered to the person who could make the worst face. The committee after mature deliberation awarded the prize to a little old lady who immediately got up and went home, protesting that she had not been playing at all!

It is not a little difficult in the midst of the general spirit of restless searching for new and better ways of conducting the affairs of our neighbors and ourselves, to know just who does and who does not belong in our little sector of the great scheme of public health activities,—just how far we can rely on old familiar faces or how much we can hope for from the newcomers. Certain it is that in common with the rest of the world we have been shaken to our foundations.

The great war which showed up so clearly the triumph of modern medicine in the control of the acute infectious diseases, which in former years had decimated the contending forces, has set forth with equal clearness the extent of the inroad that chronic diseases make in our national economy! We face the need of extending, modifying or changing our mode of attack against these, of carefully analyzing our past efforts, of studying anew not only our own capabilities but also those of all possible allies we may call to our aid. To this end it has seemed worth while to me to study the position of the central organization in our campaign with especial regard to its relation to those agencies which are, or should be, allied with us in our efforts to control tuberculosis; and these relationships apply almost equally well to either our National Association or to the state organizations through which the local work is directed in most parts of our country.

One might, for example, visualize the central organization as the switch board through which the activities of the various bodies working toward the control of tuberculosis can be coördinated with the least loss of efficiency, and directed toward the goal for which we are all striving. The more efficiently the switch board works, and the fewer the short circuits between the lines, the better will be the end results. Let us then examine these lines and see what is their state of repair, and what service we should expect of them.

HEALTH AUTHORITIES

Of first importance in our work I would place our coöperation with the established health authorities, local, state and national. Our National

Association has for years been advocating the creation of a division of tuberculosis in the United States Public Health Service, as we have the recognition at Washington of the fact that the health of our nation is of far too great importance to be cared for, as it is at present, as a side issue of the Treasury Department.

Through the devoted efforts of Mr. Baldwin, the Chairman of our Committee on Federal Legislation, and through our executive office, we have made especial efforts to keep closely in touch with General Blue's Department and to interpret its aims and needs to our civilian workers as well as to bring to its aid the experience and interest of the non-governmental tuberculosis agencies. The value of such coöperation with the United States Public Health Service is, I believe, unquestioned by any. There seems, however, to be less unanimity of opinion as to our relations with the local and state health officials.

With the local health officer of the old type, holding office through political favor or because of public recognition of his need for the one or two hundred dollar salary which the position carries, one must admit that it is usually impossible to secure anything like coöperation in a modern health campaign. I regret to say one must be equally ready to admit that our organizations have not been entirely free from the unfortunate tendency exhibited by so many voluntary health workers of conducting a one-idea campaign, which takes no regard of the functions, capabilities, or possibilities of other agencies—be they official or non-official.

According to mood we speak scornfully or jestingly of our state legislatures and of their handling of health questions. Can one hold them entirely to blame when the unofficial health workers of the state, and often the official also, bring their demands without regard to the state treasury or to the proportion of its budget which should be distributed among its health activities? Instead of this, we each ask for many times what we expect or what we could spend properly, hoping that when the legislature has in desperation pared down the grand total to within the limits of the state's resources, we may find that we have fared better than those whom we are accustomed to view as our competitors.

Would it not be better if we were all working in close coöperation with the head of the state health department who has, by virtue of his position, a much wider view of the general health situation than we, and, therefore, a much clearer idea of the relative value and importance to the state of its various health activities? Could not much be gained if we took the lead in working out in our several states "Health Councils" as one might call them, consisting of the heads of the larger voluntary health organizations, which could meet with the state health officers at regular periods, try to eliminate overlapping of effort, lend support to real health programs and put some life into ones that are mere makeshifts, and finally bring to the legislature a health budget in which the finances of the state and the relative development and importance of its various health activities had all been given due consideration?

LOCAL ORGANIZATIONS

Of primary importance, of course, are the main trunk lines connecting us with the local organizations throughout our territory and these need be kept in constant use. It is not enough to induce a company of intelligent citizens to get together and form a local organization, nor is our duty fully done when we persuade them to secure the services of a full-time trained secretary. When the people who are, or should be, back of such an association, get the idea that a full-time secretary and a list of subscribers constitute a good working organization, we must begin all over again. We must work to keep the personal interest of the members of these associations, and one of our constant tasks must be to keep active contact between them and the general work throughout the country both governmental and civil, and not only to make them feel that they have our constant support, but that we in turn are depending on their counsel and aid in our larger campaign, and that of the two ours is probably the greater need.

THE MEDICAL PROFESSION

The need of closer coöperation with the medical profession through the national, state and local medical societies as well as through the individual physicians, was never so great as now, nor was the time ever so ripe to further this end. More than 35,000 of our physicians and surgeons are coming back to civilian life. These have had the great advantage of the postgraduate courses given in all the army schools and training camps; they are more familiar than before with the latest diagnostic methods; more conversant with the relative values of clinical findings, and, what is of greater importance to us, they have almost without exception had their attention directed to the gravity of the extent to which chronic diseases, and especially tuberculosis, affect our population. They will be more ready to coöperate in our general campaign than ever before, and I would urge our lay workers to make every effort to work in close harmony with them. It is well known that in the past large numbers of our practitioners have apparently not shown that interest in our campaign which we had the right to expect. This has been due largely to the fact that the average physician finds his time fully taken up with the care of people in actual physical suffering, whether from acute or chronic diseases. This has led to a lack of interest in latent and inactive diseases which is so marked that I have known physicians to refuse to make routine examinations of their friends who had been impressed by the propaganda which the medical profession has been conducting to induce the public to adopt this very measure for the prevention of disease in general and tuberculosis in particular.

This attitude will, we hope, be somewhat modified on account of the experiences of the war. On the other hand, the lay worker needs to modify his attitude toward the local practitioner. It must always be remembered that our campaign has to be carried into the homes of the people, and that we must find ways and means of extending in these the

knowledge and practice of personal hygiene. There is no one who has the same intimate contact there as the family doctor, and a few words of his for or against any proposed health measure will carry more weight than all the educational propaganda we can employ. Let us try to study the local physician a little more closely, remembering that whether he be good or bad we will go much further working with him than against him, and above all make sure that no lack of tact or courtesy on our part can be made the excuse for opposition to our work.

As representative of your Association, I had the honor this week to participate in the Victory Meeting of the American Medical Association, and it was my privilege to assure that organization that in the many and complicated problems of public health which lie before us, they can count on the complete coöperation of our Association. May this coöperation be as complete in the local organizations as in the national directorates.

THE NURSING PROFESSION

We have heard much of the need of education of the public and of the medical profession. Now I am glad to say we are hearing more and more of the need of educating the nurses as to tuberculosis, its cure and prevention; and that this is coming largely from the leaders of that profession who are working with us. Formerly, the average nurse graduated not only without any knowledge of this most common of all diseases, but with a well trained fear of it to handicap her throughout her career. To-day the best training schools are all trying through affiliation with visiting nurse associations or nearby sanatoria to remedy this great defect in their work, and we may look forward to the time when our institutions for the treatment of tuberculosis may be able to engage regular graduate nurses without feeling that by so doing they stamp themselves as confirmed optimists.

I would urge that our central organizations do their utmost to stimulate this awakening of the training schools. We should go further and urge that the principles of public health nursing should be as important a part of the curriculum of the training schools as surgical technique or the recording of clinical data; and that the nurses be inspired to carry with them into every home the spirit of missionaries in the cause of public health, remembering that a convalescent, especially if he be of the masculine persuasion, is in a peculiarly receptive frame of mind for any wisdom which she may try to inculcate.

SANATORIA AND HOSPITALS

For the next year we should try more than ever to keep the lines busy which connect our organization and its local branches with our tuberculosis institutions. For the past two years these have faced the problem of operating not at a maximum of efficiency but with a minimum of inefficiency. Everywhere throughout the country physicians engaged in this work have answered the call of the government for men with special training, and this has resulted in many institutions being operated

with only one physician to the 100 or 150 patients, and he often physically disqualified for the easier government service. This has, of course, forced the suspension of all but the most necessary medical service, and the educational work which is, or should be, the chief accomplishment of our sanatoria, has been largely neglected. If, as we say, our campaign against tuberculosis is primarily one of education, ought we not to make a real effort to help those in charge of our state and county institutions take advantage of the wonderful opportunity presented there with a class of adults available for intensive training over several months, and eager for new interests to help pass the time?

Should it not be possible to arouse in local, civic and medical organizations sufficient interest and enthusiasm to provide regular lecture courses on general matters of public health, including especially instruction in home nursing and household economics for the women? I am not at all certain but that the education of our girls in the buying and preparing of food stuffs and in the science of home making would not do more to offset alcoholism and Bolshevism than any means at our command. Certain it is that any such effort as above would be a boon to the sanatorium management and patients and would greatly increase the value of the latter to their home communities after discharge.

INDUSTRIAL WORLD

The sixth great line that should be connected with our central switchboard is the one which gives us close contact with the industrial world; the large industrial corporations and the labor organizations. Both of these are vitally interested in all that concerns health. Industry has long ago discovered that its efficiency is largely dependent upon the health of its workers, and we have seen the advent and growth of industrial medicine with full time doctors and nurses, and with social service to connect the plant with the home interests of the employees. The employee on the other hand, has always had before him the spectre of possible ill health. He has known that barring sickness he can, if sober and industrious, get ahead in the world, and he is ever on the alert for agencies that will help him meet or avoid the burden which sickness lays upon him.

I know of no greater potential aids to our public health campaign than such organizations as our Employees Tuberculosis Relief Associations of Connecticut. The largest, that of New Haven, represents 25,000 to 35,000 working men and women. They employ a full time secretary and furnish sanatorium or hospital care to all cases of tuberculosis arising among their members or their dependents. What is more important, however, is the active interest they take in all that concerns tuberculosis work in our state; sending representatives to our national meetings and sectional conferences, and following carefully all proposed legislation at our capitol. We would do well to study such movements as this and try to give them every aid in our power.

The greatest health question before industry and labor alike is to-day that of coöperative health insurance. Most large industrial organiza-

tions already have sick benefits to which both firm and employee contribute. Is it possible or advisable to extend this plan so as to take the state, which is the general public, into the partnership, and to insure adequate care of all health problems which may arise among those whose earning capacity is not sufficient to provide such adequate care for themselves? Whether we will or will not adopt health insurance, and, if adopted, in what form it shall be applied, are to my mind the greatest health problems before the country to-day.

Our organization is here faced with a great opportunity to do a national service, and at the same time establish that close contact with the industrial world which is so essential to the perfection of our campaign throughout the country. I would urge the directors to consider whether it would not be possible for us to take a prominent part in helping the people reach the wisest decision possible on this point. If we could see our way to underwrite a plan for bringing to this country two of the best posted authorities on the principles and practice of health insurance abroad, and then procure a third man thoroughly conversant with the economic life of America, I would like to see the three taken as guests of the National Association on a tour throughout the country to present to our people from a strictly unbiased viewpoint the basic principles of coöperative health insurance and the results, both good and bad, of its application in other countries.

Suppose we devoted one day of each sectional conference to this subject, and also had a second special meeting at some other point in each conference area, inviting chambers of commerce, rotary clubs, manufacturers and labor organizations to join with us in these meetings, can you not see a role for the National Association which would greatly add to our usefulness, and which would furnish our regional secretaries with a point of contact which would establish them for all time as an integral part of the health movement of their respective sections of the country?

Please note that I am not proposing that we advocate the adoption of health insurance. I *am* proposing that we try to put before the country the best information available on the subject from a strictly neutral and scientific standpoint, and thus help the country at large as well as ourselves to come to the sanest possible decision concerning the merits or demerits of this system. Once that is done, I hope we will throw our whole weight either for or against the application of this principle in our country. I sincerely trust it may be possible for the National Association to render this public service, but at least let us abandon our attitude of passive neutrality and let the people of our country know what we do or do not stand for.

OTHER PUBLIC HEALTH ORGANIZATIONS

Most important of all, both to ourselves and the health work in general, is our relationship in the immediate future to the other great organizations interested in public health such as The American Public Health Association, American Red Cross, The Conference of State and Provincial Health

Officers, and others. Of peculiar interest to us, of course, is the determination of the Red Cross to capitalize for civilian health work after the war that marvelous spirit of service which has been centered under its management for the past four years. When last summer the Red Cross and the National Council of Defense both requested your directors to discontinue for the term of the war the sale of our Christmas Seals and to join instead in the Red Cross Roll Call, we felt most anxious as to the future. Thanks, however, to the broad fair-minded treatment accorded us by the heads of the Red Cross, we have been able to proceed with the reasonable extension of our campaign, and are now considerably in advance of any previous development of our work.

The past year was one full of delicate situations when the very existence of our Association seemed at stake, and we owe a great debt to our Managing Director for the tact, judgment, patience, and untiring energy with which he safeguarded our interests and brought us through to our present position.

The future of our financial relations with the Red Cross after the coming year is somewhat in doubt, but the return to America of our Dr. Farrand to take the Chairmanship of their Executive Committee, leaves no question of there being a complete understanding and close coöperation between us.

As regards the great dream of a National Health Council composed of the executives of several of the most prominent of our health organizations, working together toward a concerted public health program for the whole country, your directors have pledged the sympathy and coöperation of this Association to whatever extent may be possible without jeopardizing our individuality as the National Tuberculosis Association. We feel that for the present, or at least until some proven agency appears which is better fitted for the work than we ourselves, it would be a grave error for us to go beyond that point. We are, however, in hearty sympathy with the movement for the coördination of the public health associations of our country, and see before us many problems, the solution of which will call for the best efforts of our mutual forces and counsels.

UNIVERSAL MILITARY SERVICE

A man may be forgiven a mistake but not if he make the same mistake twice. The selective draft through which we raised our army presented to our national health associations a golden opportunity,—for which they were wholly unprepared and by which they profited but little. The records of our draft boards gave, or should have given us, the records of the vast majority of cases of active tuberculosis in our male population between the ages of 18 and 35. We had never dreamt of such an opportunity. It meant the chance not only to control countless active cases hitherto unknown, but through these to reach the homes and do real preventive work among the rising generation there.

You remember the tale of the fool and the wise man who having done a kindness to the fairies were each given one wish by the fairy queen.

The fool coming first wished for all the gold and jewels he could carry home in his cart. The wise man coming after and hearing this merely asked for the fool's address. Had we foreseen this draft and been able to secure access to the addresses of these rejects, what wealth would have been ours! We did try; with all the means and all the eloquence at our command we importuned the War Department to give us these addresses, or to make it possible for us to get them, but we began too late.

There was no one to blame for this but the spirit of the times. Our draft law was designed for the one thing which it accomplished, and the temper of our people was such as to have made it out of the question to have secured consideration of anything which was not then thoroughly recognized as necessary to military efficiency. The Department had, as its first responsibility, the gathering, equipping and dispatching of our army with all possible speed. Like ourselves they had made no study of the opportunities presented by the draft, and were loath to add to its machinery in any way. In spite of all we could urge it was therefore impossible to get access to these records until this past winter, when 61,964 cards were placed at our disposal. Since that time we have had these records transcribed and forwarded to the authorities of the several states,—just two years too late, in most instances.

If, however, we have learned our lesson, and I trust we have, a similar golden opportunity will be ours again. Who doubts that in the near future we will adapt some form of military service for all our young men, so that never again will scorn for our latent power give heart to an international marauder? It is well within the range of possibilities that we may have all of our young men as they reach the age of 18 under military training for six months or more. Consider what that can mean from the standpoint of national health! A chance for a complete physical study and, if need be, corrective physical training during this period for every young man now in our land. My only criticism of the idea is that we have not proposed the same training for our women also. It will offer, even more than the recent draft, a golden opportunity for national health work, and it is for us this time to play the part of the wise man. Let us start now through every state and local agency, and through our national office, to urge in print and on the platform that the benefits of universal military service from the standpoint of national health can and should be made even more real than the unquestioned value of military preparedness it will give us. Let us start now to see to it that our representatives in Washington realize this and that the regulations governing this service, when it comes, are so drawn, as to provide that the health records of each man be filed with the United States Public Health Service and with the state Board of Health of his own state.

It should be easier for us to do this than it would have been two years ago. We have nearly 3,000,000 men returning to private life with a new conception of national and personal obligations, and whose eyes have been opened to the great advantages of physical training, of personal hygiene and of public sanitation. No one could, I think, watch the parade of one of our returning divisions without feeling that here was a

new force with a cleanness and virility and a unity of purpose hitherto unknown in our American life. If through our united efforts we can pass on something of this same freshness and virility to all of our young men at the time when they are preparing to take their part in the conduct of our country's affairs, then we could indeed feel that we had justified all the expenditures of time and thought and money that have gone into the work of our national health organizations.

REPORT OF THE EXECUTIVE OFFICE FOR THE YEAR ENDING MAY 31, 1919

When the National Tuberculosis Association met at Boston a year ago no one could have foreseen the remarkable development that was to take place in the work of the Association and in the anti-tuberculosis campaign throughout the United States. Without exception, the year just passed has been the greatest and most productive of any year in the Association's existence. The National Association and its various state and local organizations have generally had more money to spend and have had a larger vision and a better opportunity to spend it. The net result of the year's work is the placing of the drive against tuberculosis upon a firm business foundation. With a strong, adequately financed and businesslike state organization in every state of the Union, and with well organized and properly manned local associations in most of the larger centers of population, the anti-tuberculosis campaign can look forward to making much more rapid progress during the next five years than it has during any previous period of its existence.

This report will give a brief summary of some of the principal activities of the National Association; to catalog all of them would require much more time than could be allowed in a meeting of this character.

I. FINANCIAL ARRANGEMENTS WITH THE AMERICAN RED CROSS

1. Discontinuance of the Seal Sale

When the National Association met in Boston a year ago arrangements for the Red Cross Christmas Seal sale of 1918 were well under way, and up until the early part of July, the printing of seals, the distribution of contracts and other details necessary for the conduct of the campaign proceeded rapidly. During the first week of July the National Association was requested by the American Red Cross to discontinue its arrangements for a Christmas seal sale. After a series of conferences lasting through the month of August and continuing on into September, arrangements were finally completed whereby the National Association agreed to relinquish its campaign for the sale of Christmas seals during the holiday season of 1918. The American Red Cross in turn agreed to appropriate the sum of $2,500,000 to be distributed by the National Association to its various state and local organizations and for its own support, this sum to be considered in lieu of the amount that might have been received from the sale of seals and to be used for the financing of the work against tuberculosis in the United States during the year 1919.

2. Basis of Appropriation

The appropriation of the American Red Cross was based upon a series of budgets collected from the state associations by the national office

during the month of August. The total of these budgets aggregated a little over $2,900,000. The appropriation of the American Red Cross was fixed at $2,500,000 after careful consideration on the part of the War Council and the Medical Advisory Committee, and in conference with the Executive Committee of the National Tuberculosis Association.

3. Basis of Distribution of Funds

The Executive Committee of the National Tuberculosis Association with the approval of the Board of Directors worked out the following basis for the distribution of funds:

(*a*) Ten per cent. of the fund was to be set aside for the budget of the National Association, amounting to approximately $145,000, and an emergency or missionary fund to be distributed at the discretion of the Executive Committee.

(*b*) Each state association was to be granted an amount equal to the gross proceeds from the sale of Red Cross seals in 1917 as reported up to December 1, 1918.

(*c*) Each state association was entitled, in addition, to an amount based upon the ratio between the number of members enrolled in the Red Cross Christmas Roll Call in 1918 in that state and the total Roll Call of the United States.

(*d*) Specific additional requests would be granted from the missionary fund on compliance with certain rules laid down by the Executive Committee.

(*e*) No state could receive without special authorization of the Executive Committee an amount greater than the budget submitted in August, 1918, this latter provision being based upon the fact that the appropriation of the Red Cross was based directly upon the aggregate of the budgets submitted by the various states.

4. Methods of Distribution

The Red Cross funds are being distributed in quarterly allotments in accordance with definite contracts signed by each state association. The requisitions required as a basis for distribution indicate the manner in which it is proposed to spend the money, and the reports submitted at the close of each quarter indicate the manner in which the money has actually been expended. It is anticipated that a considerable amount of valuable statistical data relative to the budgets and programs of the various associations will be received.

Due to the fact that the funds are being appropriated by the National Association only to state associations and through the state associations to local associations, unusual strides have been made in various states along the lines of standardization of work and the bringing up to a higher level of associations that have conducted inadequate programs. The National Association has had a somewhat similar experience with reference to certain states with which it has dealt. The distribution of the money gives the state and the national organization a powerful lever with which to urge reorganization and higher grades of work.

II. RED CROSS SEAL SALE

1. Arrangements with the Red Cross

Whatever the advantages of the financial plan for 1919 may be (and they are not inconsiderable) the Board of Directors of the National Association has definitely expressed the conviction that the Red Cross seal sale or some other independent method of financing the anti-tuberculosis campaign is much better than to have a direct appropriation from the American Red Cross, even if such an arrangement for 1920 were possible. Accordingly, on March 5 definite arrangements were perfected with the American Red Cross whereby the National Association is allowed to issue Red Cross seals, using the Red Cross on the seals to indicate the sanction and participation of the Red Cross in the campaign. Arrangements have been perfected, however, whereby the National Association will assume more direct business control of the campaign, paying for and distributing all of the supplies, receiving the returns from the seal, etc.

2. Conference of Sales Agents

On March 21 a conference of sales agents was held in Cincinnati at which 27 different states in every part of the country were represented. The sentiment expressed at this conference was practically unanimous in favor of a Red Cross seal sale. The sentiment also was in favor of a greatly expanded plan of campaign, those present realizing that the tuberculosis movement must profit by the experience of the war drives of the last two years. A budget of approximately $150,000 for the printing and campaign expenses, as proposed by the National Association, was approved at the Cincinnati conference.

3. Employment of Campaign Manager

As one of the first steps in the campaign, the National Association has employed Mr. Elmore Leffingwell, campaign director for the recent Salvation Army drive which resulted in the securing of $16,000,000 for that organization. Mr. Leffingwell comes to the Association with a wealth of experience in publicity and campaign work. The immediate organization of the Christmas seal department will consist in addition to Mr. Leffingwell as Campaign Director of Mr. B. G. Eaves of the regular staff of the National Association as Sales Manager, and Mr. J. D. Halliday also of the staff of the Association as Publicity Director.

4. Quotas

The question of quotas for the United States and the various state and local communities was vigorously discussed at the Cincinnati conference. The consensus of opinion was that the national quota should be at least $6,000,000. After careful consultation, and on the advice of Mr. Leffingwell, it was decided that any quota adopted should be based on actual needs. Accordingly, each state is submitting a budget based upon its needs for 1920 and the national quota will be the total of these state bud-

gets. We are assured by campaign organizers of the highest calibre and the widest experience that once the need for the money can be demonstrated, the methods for securing the money can easily be developed. It is anticipated that the national quota and the individual state quotas will be announced at a special conference to follow this meeting on Wednesday, June 18.

5. Outlook

Although the Red Cross is planning to conduct a financial campaign in conjunction with similar efforts in 28 foreign countries during the early part of the month of November, there should be no reason for discouragement on the part of the tuberculosis forces in the conduct of a Red Cross seal campaign during the Christmas holidays. Not only the need for tuberculosis work and the local emphasis of the cause, but more than that, the organization of the campaign and the machinery available make sure of attainment any reasonable target decided upon for the sale.

III. WAR PROGRAM

Some of the preliminary features of the war program of the National Association were reported upon at the last annual meeting of the Association. It will not be necessary in this report to dwell upon these features of the work. Suffice it to say that every possible avenue of coöperation into which the National Association could enter has been utilized and that everything possible that could be done for the tuberculous soldier in the camp or after discharge has been and is being done.

1. Education

The war educational campaign of the Association falls under four distinct heads: first, the work in the camps at home. This consisted of exhibits, literature and stock lectures developed partially under the Y. M. C. A. and partially by independent efforts directly from the executive office.

Second, the educational work in the camps abroad. This has been developed largely within the last six months. The Association has furnished for the education of the American Army of Occupation and the troops of the A. E. F. a very considerable amount of literature, exhibit and lecture material.

Third, the educational work in the hospitals. This work consists largely in the furnishing of books for the libraries of the hospitals. A considerable number of books dealing with tuberculosis have been furnished through the American Library Association to the various tuberculosis hospitals, and arrangements have also been made for the distribution of an attractive circular advertising these books and other tuberculosis literature to the soldiers.

Fourth, the provision of information for anti-tuberculosis workers. This has required a considerable amount of printing and publication not only in the BULLETIN, but in other ways, especially through the publication of a special pamphlet entitled, "What Tuberculosis Workers Should Know About Discharged Soldiers and Rejected Men" (Pamphlet 109).

2. *Follow-up Work*

As reported a year ago, the office of the Surgeon General of the United States of America has continued its coöperation up until the signing of the armistice in the reporting of names of men discharged or rejected at army camps on account of tuberculosis. Over 20,000 such names have been received. In addition to these, the office of the Surgeon General has also been reporting the names of men discharged from army tuberculosis hospitals with information concerning their condition, names of guarantors wherever there are such, etc. Approximately 1715 of these names have been reported to June 1. In addition, arrangements were perfected in the late fall for the transcription of the names of men rejected on account of tuberculosis by draft boards, from records then on file in the Bureau of Medical Records of the Surgeon General's office. Due to the courtesy of Colonel Albert G. Love, desk room was provided and a stenographic force was engaged which succeeded in transcribing on specially prepared cards nearly 62,000 names of men rejected in the second, third and fourth drafts on account of tuberculosis.

The National Tuberculosis Association has acted as a clearing house for transmitting these names to local and state organizations that are interested in following them up. The names of men discharged from army hospitals or discharged and rejected from army camps have been uniformly reported to state tuberculosis associations, state departments of health, and division directors of civilian relief of the American Red Cross in the district where the men were located; the names of men rejected by the draft boards have been reported to state tuberculosis associations only. The National Association, as will be noted from figures here given, has thus handled to June 1 approximately 85,000 names.

3. *Coöperation with Other Agencies*

In developing our war program, it has been found necessary and desirable to coöperate with a considerable number of different agencies. Some of the principal ones with whom such coöperation has been secured are the American Red Cross, the United States Public Health Service, the offices of the Surgeon Generals of the United States Army and Navy, Bureau of War Risk Insurance, Federal Board for Vocational Education, Capital Issues Committee of the War Industries Board, United States Marine Corps, Y. M. C. A. and others.

4. *Coöperation with Federal Board for Vocational Education*

As part of the war program, arrangements were made in the fall for definite coöperation with the Federal Board for Vocational Education. An Advisory Committee was formed by the National Association to coöperate with the Federal Board and Dr. Pattison of the staff of the Association was detailed as secretary of the committee for a period of several months. For about eight months Dr. Pattison has been engaged in studying the special problem of the vocational training and employment of discharged tuberculous soldiers. Inasmuch as one of the sessions of the Sociological Section will deal with this problem and the work of

the Federal Board, it will not be necessary to enter into detail here as to the accomplishments of the committee. While the employment of Dr. Pattison as a special representative of the Board has been discontinued, a close relationship with the Board is being maintained.

IV. FIELD WORK

1. Field Policy

The appropriation of the American Red Cross to the budget of the National Association has made possible the realization of certain ideals in field work that have been in the mind of the Executive Committee and the executive staff for some time. Foremost among these ideals was the development of a field policy whereby a regional secretary should be located in each of the conference districts and with definite supervision from the home office.

2. Appointment of Regional Secretaries

To carry out this plan, regional secretaries have been appointed as follows: Mr. George Everson, secretary for the Northwestern states with headquarters at Spokane; Mr. Murray A. Auerbach, secretary for the Southern states with headquarters at Atlanta; and Mr. Leet B. Myers, secretary for the New England states with headquarters at New York. On account of the shortage of men, it has not been possible as yet to secure the secretaries who would answer the needs of the situation for the North Atlantic, Mississippi Valley and Southwestern states, but it is hoped that before long such men may be appointed.

3. Work of the Regional Secretaries

In the comparatively short time that the regional secretaries have been in the field, they have clearly demonstrated the wisdom of the policy under which they were employed. In every instance the more intimate and frequent contact which they have been able to render to the various states that they serve has resulted in the raising of the standards of work and the adjustment of difficulties which would have been almost impossible of adjustment with the previous limited field staff of the Association. Mr. Hopkins as general field supervisor has contributed greatly to the success of the regional secretaries, but too much cannot be said of the skillful and tactful work of the regional men themselves.

4. General Field Work

In addition to the work of the regional secretaries, it has been found necessary to detail individual members of the executive staff for special field trips of various kinds. The Managing Director, the Assistant Secretary and others have been required to make long and short trips to different parts of the country on special occasions, and during the sectional conferences practically every member of the staff has been called out.

V. MODERN HEALTH CRUSADE

1. Development of Crusade

The school year just closing has witnessed the greatest development of the Modern Health Crusade since the organization of that movement. Nearly 3,000,000 school children have been enrolled as active Crusaders.

2. National Tournament

In coöperation with the Junior Red Cross, arrangements were made in the fall of 1918 for the conduct of a national tournament of 15 weeks beginning with February. The Junior Red Cross was in position to contribute through its various local chapters for the purchase of supplies and in other ways. This coöperation together with the stimulus of the national tournament has greatly aided the development of the Crusade.

3. The Crusade as a Part of the School Curriculum

During the last year special emphasis has been laid upon the development of the Modern Health Crusade not so much as an organization, but rather as a system of health education. With this end in view, efforts have been made to interest prominent educators through their annual meetings and individually in getting the Crusade installed as an integral part of the school curriculum, taking the place of some of the more pedantic courses in physiology and hygiene.

4. Supplies Distributed

Some conception of the development of the Crusade and the amount of work which this movement entails upon the office of the National Association can be gathered from the figures indicating the amount of supplies distributed. During the last year approximately 1,175,080 gold and silver pins have been distributed; 2,211,501 buttons, 5,064,551 chore folders, and 4,329,054 additional pieces of literature.

5. Value of the Crusade

The value of the Modern Health Crusade in assisting children to develop correct health habits can hardly be over-emphasized. The boys and girls of to-day who are learning how to take care of their bodies will be the champions of public health in the next 15 or 25 years. Furthermore, the children are bringing their parents in thousands of cases to a greater realization of their responsibility for their own health and for the health of their communities. The Crusade is without doubt one of the most productive educational developments of the anti-tuberculosis campaign.

VI. PUBLICITY

1. Staff

During the last year the publicity staff of the National Association has been changed and augmented. Mr. John Daniels, who was publicity secretary a year ago, resigned in November and was succeeded by Mr. B. G. Eaves. Mr. J. D. Halliday was added to the staff in April, and Miss Helena V. Williams on June 1.

2. Monthly Bulletin

The monthly BULLETIN of the Association has been greatly improved in quality and augmented in size. The demand for this house organ of the Association is increasing steadily. At the present time our mailing list consists of approximately 10,000. The BULLETIN is costing the Association between $2000 and $2500 a year, but the money seems to be decidedly well spent.

3. The American Review of Tuberculosis

The AMERICAN REVIEW OF TUBERCULOSIS has continued to maintain its prestige and is now rated by competent authorities as among the leading tuberculosis periodicals of the world, not excepting certain foreign publications that have been in the field for many years. The REVIEW is being published at a loss of approximately $3000 a year, but its growing popularity and its value as an educational medium to physicians is such that the Association can well afford to provide a subsidy and continue its publication.

4. Journal of the Outdoor Life

THE JOURNAL OF THE OUTDOOR LIFE, while not officially a part of the National Association, has practically been published as one of the Association's own publications. It is answering a distinct need in supplying a popular medium for the publication of valuable material that is not sufficiently technical to go into the REVIEW and that is too long or not of the proper character for publication in the BULLETIN. Plans for the formal taking over of the JOURNAL by the National Association are being considered. THE JOURNAL OF THE OUTDOOR LIFE is a self-supporting publication.

5. Routine Publicity

The routine publicity of the Association has been progressing favorably. Due to the immense volume of propaganda and publicity matter which is flooding the country from every possible source, our publicity staff has refrained from putting out material that did not have distinct news value with the result that the material put out by us is uniformly popular with the editors.

6. Red Cross Seal Plans

The publicity plans for the Red Cross seal sale are well under way and comprehend an attractive array of publicity that should provide a saturation sufficient to reach every city, town, village and hamlet of the country.

7. Loan Service

The establishment of a definite loan and publicity service has given the publicity department a new method of approach to the various state and local associations. By this service educational material consisting of motion pictures, lantern slides, photographs, scrapbooks and bulletins of suggestions are being prepared and loaned to different organizations

throughout the country. The service aims to help in the organization and development of special campaigns.

8. Motion Picture Service

The success of the motion picture service has been so pronounced that a new motion picture has been produced by the Association. This picture entitled "The Modern Health Crusade" deals with the Crusader movement. If opportunity is presented, it will be shown at this meeting. The picture will be available for sale and rent to associations and motion picture theaters in the immediate future. The cost of the production of the picture, exclusive of prints which are still to be secured, was $2500. An effort is also being made in the motion picture service to secure prints of other films taken by different health and anti-tuberculosis associations.

VII. RESEARCH WORK

1. Organization of Research Department

During the last year the executive office has further developed its research department. As organized at present, the department consists of Miss Jessamine S. Whitney, who is responsible primarily for the statistical research; Miss Eleanor B. Conklin, who is responsible primarily for reviewing of publications, the Tuberculosis Directory, and the editorial work of the department; and Miss Josephine M. Stults, who is responsible for the library and the filing of books, pamphlets and records. Under this arrangement it is anticipated that within the next six months the Association will be in position to develop a much higher standard of research work than has been possible heretofore.

2. Special Studies

Some special studies undertaken during the last year are worthy of mention. Under the direction of Mr. Myers a special study of the Negro and tuberculosis has been made and will be published shortly. The preparation of Pamphlet 109 entitled, "What Tuberculosis Workers Should Know About Discharged Soldiers and Rejected Men," has involved a very considerable amount of research, especially on the part of Mr. Baldwin, Chairman of the Committee on Federal Legislation. Pamphlet 102 entitled, "The Effect of Tuberculosis Institutions on the Value and Desirability of Surrounding Property," is being revised and brought up to date. A special study in conjunction with the establishment of a proposed industrial colony has been conducted by Dr. Pattison and Miss Whitney. The Tuberculosis Directory has been revised under the direction of Miss Conklin and is now being printed. A pamphlet entitled, "To the Children of America," translated from the French pamphlet, "Aux Enfants de France," published by the American Commission on the Prevention of Tuberculosis in France has been printed in English for popular distribution. Construction of hospitals during the war has required a considerable amount of research by Dr. Pattison. In addition to all these activities, the research department has edited and prepared the TRANSACTIONS consisting of a volume of over 600 pages.

VIII. CONFERENCES

1. 1918 Conferences

All of the sectional conferences planned for the fall of 1918 were interfered with somewhat by the epidemic of influenza. The Northwestern, Southwestern and Mississippi Valley conferences were held as scheduled, but it was found necessary to postpone the Southern and North Atlantic conferences and they were held later. The New England conference was omitted entirely. In spite of the panic caused by the epidemic, the conferences that were held were uniformly well attended and successful.

2. Conference Plans for 1919

Six sectional conferences are being planned for 1919 as follows: The New England conference to meet at Providence; the North Atlantic conference, place not determined; the Southern conference to meet at New Orleans; the Southwestern conference to meet at Los Angeles; and the Northwestern conference to meet at Boise, Idaho. The Mississippi Valley conference is scheduled to meet at Des Moines, Iowa. These conferences will begin during the latter part of September and will continue during the month of October. The executive office has its plans for the conferences well under way.

IX. INSTITUTE

The third Institute for Tuberculosis Workers was held at the School of Philanthropy in June, 1918, immediately following the annual meeting at Boston. The demand for places at this Institute was so great that it was decided to hold two of them in 1919. The first one of the year was held in January and February and the second one in May and June, just preceding this meeting. The Institutes have been attended by approximately 60 workers. The development of the tuberculosis movement is making the training of workers more and more a necessity. The realization on the part of a growing number of local communities that if they are going to carry on a successful campaign they must have a full-time worker is making the demand for trained workers in comparison with the available supply particularly acute.

X. EMPLOYMENT SERVICE

As reported at the last annual meeting of the Association, the National Association was at that time negotiating with the National Social Workers' Exchange in regard to the taking over of the employment service and the placement of people who were interested in securing positions in tuberculosis work. The experiment with the Exchange was so successful that the Board of Directors has decided to continue it for the current year. The Association is paying the Exchange a sum of $750 for the year and in return the Exchange is making placements and securing information about candidates and positions in every branch of the tuberculosis field. During the last year the Exchange has been in contact with approximately 696 people; of these people 31 have been placed in posi-

tions. More than 166 positions have been referred to the Exchange for filling. The volume of work that the Exchange has done and the relief that has been afforded to the executive office is very considerable.

XI. INDIGENT MIGRATORY CONSUMPTIVES

At the meeting of the Southwestern Tuberculosis Conference held at Denver last October, resolutions were adopted calling upon the National Tuberculosis Association to make a special study of the problem of the indigent migratory consumptive with particular reference to the Southwestern states. Acting upon this request, the Board of Directors authorized an appointment of a special committee of which Mr. James H. Pershing of Denver has been made chairman. Dr. Severance Burrage of the United States Public Health Service was loaned to the Association to act as secretary of the committee. His headquarters have been at Denver since early in the year. Inasmuch as a report of the committee will be rendered at this meeting, it will not be necessary to discuss its work at this time.

XII. FRAMINGHAM DEMONSTRATION

This year rounds out the period of three years originally proposed by the Metropolitan Life Insurance Company for the Demonstration at Framingham, Mass. At the recommendation of the Framingham Committee, a special committee on the appraisal of the value of the Framingham Demonstration has been appointed and during the summer months this committee will make an independent study of the work. The committee is under the direction of United States Public Health Service and the executive work will be in charge of Professor C.-E. A. Winslow of Yale University. The findings of the committee will determine not only the value of the work at Framingham, but also the desirability of a continuation of the work.

Inasmuch as the accomplishments of the Framingham demonstration are published in a series of monographs, five of which are already available, it will not be necessary to detail the work at this time.

XIII. EDUCATIONAL LITERATURE

In addition to the educational material distributed through the Modern Health Crusade, the executive office of the National Association has served as a clearing house for a considerable amount of other educational material. For example, nearly 400,000 leaflets entitled, "Beware Tuberculosis After Influenza," have been printed and distributed; over 75,000 copies of Pamphlet 106 and 75,000 of Pamphlet 101,—making over 500,000 of these pamphlets that have been distributed in the last three years. In addition a very considerable number of "Don't Cards," posters and other literature have been sent out. THE JOURNAL OF THE OUTDOOR LIFE has materially contributed to the educational work by acting as a clearing house for the handling of books and other material.

XIV. NATIONAL MEDICAL EXAMINATION CAMPAIGN

In accordance with the plans of the Executive Committee and the Board of Directors, it is proposed to conduct a national campaign for medical examination in the spring of 1920. This campaign will be organized and conducted by the National Association in coöperation with other national health agencies.

XV. INCORPORATION

The incorporation of the National Association under its new name, "National Tuberculosis Association," was perfected in December, 1918. Under the laws of Maine, the headquarters are officially at Portland, Maine, but this arrangement is merely a legal fiction.

XVI. MEMBERSHIP

A year ago the membership of the Association was reported as 4050. At the present time the membership of the Association is 4066. Although the membership has remained approximately stationary, when we consider that a very large number of the members secured a year ago were brought in by a special drive, the present membership of the Association offers reason for gratification. Instead of a drive, the Association is now conducting a continuous membership campaign utilizing lists secured from state associations and in other ways.

XVII. DEATH RATE AND TUBERCULOSIS

Comment has been caused in various parts of the country because of an apparent rise in the death rate from tuberculosis. This increase has been attributed by different critics of the campaign either to conditions caused by the war, or to the failure of the anti-tuberculosis campaign. Consultation of the executive office with various experts indicates that in the opinion of the majority of them the gradual decline in the death rate from tuberculosis during the last 15 years is likely to continue. Taking the original registration states where the figures are available for a considerable number of years, it will be noted that the death rate has fallen from 195.2 per 100,000 population in 1900 to 180.9 in 1905, 164.6 in 1910, and 143.5 in 1916. While the 1917 figures are not available for publication, we are informed by the Bureau of the Census that the rate will be between 146 and 147 per 100,000 population. These figures are for tuberculosis of all forms.

The death rate in the registration area from 1916 to 1917 will thus show a slight increase. This increase, however, is little greater than that which has been shown between two or more successive years in the death rate during the last 15 years. The significant fact to note is that the gradual trend of the curve is downward and that while it may remain stationary for a short time, the indications are that it will continue after the present disturbed conditions subside to go downward. This statement seems to be demonstrated furthermore by the experience of such

states as New York and Massachusetts where there appears to be a slight increase in the death rate during the last two or three years, but where the tendency has been downward for a period of ten or more years.

The reasons for the disturbed condition of the death rate, are apparently not to be found either in the hardships caused by the war, nor in the failure of the anti-tuberculosis campaign to measure up to its responsibility. The increase is more than likely caused by such factors as enormous shifting in the population during the last three years, unusual change in the economic status of a very considerable portion of both the male and female population, the bringing to light of practically 100,000 previously undiscovered cases of tuberculosis by the war machinery, and the increased emphasis on tuberculosis caused by the war which has undoubtedly been reflected in the increased zeal in reporting tuberculosis as tuberculosis throughout the United States.

XVIII. WORK OF COMMITTEES

Special mention should be made in this report of the splendid work of some of the committees of the Association during the past year.

1. Framingham Committee

The Framingham Committee by its careful and painstaking consideration of the work being done in the Demonstration at Framingham has contributed much to the success of the work there.

2. Committee on Federal Legislation

Under the leadership of Mr. William H. Baldwin, the Committee on Federal Legislation has been a real representative of the National Tuberculosis Association before Congress and also before the various federal bodies with which the National Association has been obliged to transact business. Mr. Baldwin and his committee have pushed vigorously such legislation as that for a Division of Tuberculosis and other bills providing for the support of United States Public Health Service, Federal Board for Vocational Education, etc. In addition to this service, the committee has had repeated conference with the Surgeon Generals of the Army and the United States Public Health Service, with the Bureau of War Risk Insurance, and numerous other bodies, and has helped materially to interpret the needs of the tuberculosis movement to these agencies.

3. Committee on Dusty Trades

The Committee on Dusty Trades, under the leadership of Mr. Frederick L. Hoffman, has been conducting studies in the quarries of Indiana and Vermont, and has recently published a preliminary report on the work accomplished. The Association has appropriated $1000 for the clerical and other incidental work of Mr. Hoffman.

4. Committee on Hospital Standardization and Classification

The Committee on Hospital Standardization and Classification, under the leadership of Dr. Lawrason Brown, has given a large amount of

careful study to the feasibility of classifying tuberculosis hospitals according to the standards of work being done in them. The subject has been discussed at meetings of the American Sanatorium Association. Dr. Pattison of the executive office staff has been helpful in developing the standards thus far worked out.

5. Historical Committee

A committee to prepare a history of the National Tuberculosis Association's campaign in the United States, consisting of the following members has been appointed by the Board of Directors: Dr. Hermann M. Biggs, Dr. Henry Barton Jacobs, Dr. George M. Kober, Dr. S. Adolphus Knopf, Dr. Charles J. Hatfield.

XIX. FINANCES

1. Change of Fiscal Year

In accordance with the general plan for the distribution of Red Cross funds, the National Tuberculosis Association has conformed with the request made to state and local associations and has changed its fiscal year to coincide with the calendar year. This necessitates the rendering of two financial statements, one for the period May 1 to December 31, and the other for the period January 1 to June 1. Inasmuch as the two periods of operation are distinctly different, both in their method of financing and also in the extent of work organized, such a double report should prove helpful.

2. Report from May 1 to December 31

During the period from May 1 to December 31, the receipts of the Executive Office, including a balance of $9660 on hand, were $86,308. The total disbursements were $83,256.48, an amount considerably over the estimated budget for that period due to the greatly increased volume of work and to the very large increase in costs of labor, material and supplies which could not have been anticipated when the budget was prepared. On January 1 the Association had a balance of only $3052.06.

3. Report from January 1 to June 1

The financial report of the period embracing the last five months must take into consideration several factors, first that the executive office of the National Association has been the distributing agent for the funds received from the American Red Cross not only for the budget of the Association itself, but also for the budgets of the several state associations as well. The aggregate receipts of the executive office for the period ending June 1 have been $1,690,413.29, and the aggregate disbursements $1,258,529.73. This leaves a total balance on June 1 of $431,883.56.

In a report of the work of the National Tuberculosis Association, however, a distinction must be made between the expenditures for the budget of the National Association itself and for those funds which it has passed on to state associations. Taking up the former funds first, it should be noted that of the $1,500,000 received from the American Red Cross for

the first and second quarters' payments, the sum of $1,078,568.88 has been appropriated to state associations. There is a balance in the hands of the National Association due to state associations of $321,341.12. In accordance with the plans of the Executive Committee, this money cannot be appropriated except on requisition duly approved by the executive office.

The Missionary fund of $104,103 has been appropriated up to $95,600, leaving a balance of $8503 still to be distributed by the Executive Committee. This balance may be slightly increased by transfers from one or two funds set aside for specific purposes but not finally paid.

The National Tuberculosis Association has for its own budget expended during the five months from January 1 to June 1 a net sum of approximately $70,000. The gross sum, however, which the Association has been required to expend has amounted to $156,960.85. The difference between the net and the gross sums is due to the very large amount of supplies purchased for re-sale, including an item of nearly $71,000 for Modern Health Crusader supplies. The policy of the Association in the purchase of such supplies is to cover actual costs with a slight profit for handling, but with no profit for overhead expense. In view of the very large quantities purchased by the Association, the state and local organizations which buy supplies from us get them at a price generally very much lower than they can purchase them in their own communities.

In addition to the receipts from the American Red Cross, the total receipts of the Association from other sources have been comparatively negligible, amounting during the last five months to only $6,506.32, of which the larger share was from membership dues. The dependence of the National Tuberculosis Association on the Red Cross seal sale is thus clearly indicated.

With regard to the budget of the National Tuberculosis Association, the detailed report of the treasurer is available for inspection and will be published in the TRANSACTIONS. The Executive Committee has scrutinized carefully every item of expenditure, and it is the belief of those who have looked over the work of the National Association that the executive office is being administered in an efficient and economical manner.

XX. OUTSTANDING NEEDS

In closing this report there are a few outstanding needs of the Association for 1920 which may be enumerated briefly:

1. Consulting Architect

One of the most necessary additions to the staff of the Association is a consulting architect, a man who is a trained architect and knows tuberculosis sanatorium construction and who can be detailed to consult with groups and individuals who are planning to build institutions. It is hoped that such a man can be secured with funds available from the Christmas seal sale.

2. Additional Medical Field Secretaries

If the Association is going to accomplish its task of raising the standard of knowledge among the medical profession and among the medical students with regard to tuberculosis, more medical field secretaries are needed. One additional secretary is immediately needed and two more can be used.

3. Establishment of Special Medical Courses

The necessity for the establishment of special training schools for physicians who need instruction in tuberculosis is imperative. The success of the Trudeau School and the development of the schools of the United States Army have shown what can be done along this line. The National Association should establish teaching centers similar to the Trudeau Schools in several different parts of the United States.

4. Traveling Crusader Representative

The development of the Modern Health Crusader movement has made it desirable to put on the staff a person who can travel about the country representing the Modern Health Crusade and develop higher standards of work in different parts of the country. Such an individual would supplement the work of the regional secretaries and the state secretaries.

5. Additional Publicity

The increasing campaigns require increasing publicity. During the next year the Association should spend several times the amount of money that has been spent in previous years on publicity and educational work. This deals not only with newspaper publicity, but with other kinds of educational work, such as the development of the motion picture service, loan service, etc.

6. Additional Clerical Service

These added needs will require additional clerical service and no doubt an additional amount of space for the executive office.

XXI. CONCLUSION

In conclusion we wish to state that the National Association as a whole and the executive office in particular is under very great obligations to the President, Dr. Lyman, for his splendid support during the year. With the avowed purpose of making the President's activities a contribution to the war, during the heat of last summer Dr. Lyman was in Washington for the frequent conferences with the Red Cross, and, in the fall and winter, attended most of the sectional conferences and all of the frequent Executive Committee meetings, as well as many incidental conferences where the interests of the National Association were at stake. The President's contribution to the successful work of this last year cannot be overestimated.

The thanks of all of us are due also to the untiring efforts of our Treasurer, Mr. Baldwin, as Chairman of the Committee on Federal Legislation.

Through Mr. Baldwin's untiring interest, a constant watch has been kept on the developments in Washington and the Association can be sure that its interests were most efficiently and splendidly guarded.

The thanks of the executive office as well as those of the Association may well be extended to the members of the Executive Committee. Their frequent meetings during the past year have meant great sacrifices in time and money on the part of every member. Without them the development of the program of work as reported upon here would have been much more difficult.

Finally, the thanks of the Managing Director are extended to all of the members of the executive staff whose faithful and loyal services have helped to a very considerable degree to contribute to the success of the work during the past year.

Respectfully submitted,

CHARLES J. HATFIELD,
Managing Director.

ADVISORY COUNCIL

Chairman

HOYT E. DEARHOLT, M. D.

MILWAUKEE.

HEALTH PROGRAMS

By JOHN R. COMMONS

Madison, Wis.

The campaign against tuberculosis has given to the American people a new idea of the doctor. We had thought of him as a last resort after we had doctored ourselves and tried out the patent medicines and practiced faith. The anti-tuberculosis movement has begun to show us that the doctor should be first. We *know* that we need him in sickness. We begin to want him also to *prevent* sickness.

Likewise, the workingmen's accident compensation laws have given us a new idea regarding *insurance*. We got our idea of insurance from life insurance. Death is inevitable, and the purpose of life insurance is the *philanthropic* purpose of paying uncertain but unavoidable expenses when dead. So we thought that accidents were inevitable, and that the purpose of accident insurance was the philanthropic purpose of *relief* to injured workmen and to the families of killed workmen. But the compensation laws have shown us that accidents are largely preventable and that employers can prevent them. So we have learned to think that the first purpose of accident insurance is the *business* purpose of making money by preventing accidents.

These compensation laws have a double mechanism. They are an employer's tax on accidents and a workman's insurance against unprevented accidents. Employers can escape the tax, and thus cut down the cost of compensation, by preventing accidents. There are records of employers who have reduced accidents 90 per cent. Some of them affirm that the money put into accident-prevention is the most profitable part of their business.

So, a new profession has sprung up. Or, rather, those persons who formerly practiced the profession of claim-agent for the purpose of protecting their employers against lawsuits, have become *safety experts*, and they now protect their employers against the tax on accidents, by preventing the accidents.

I sometimes think it is more difficult to persuade the average doctor to become a health expert and to prevent sickness than it was to convert the claim-agent into a safety expert to prevent accidents. As a matter of fact the claim-agent fought the process of conversion about as stiffly as he could, and it was only the overwhelming power of a tax on accidents that converted him. Now he is proud of his new profession, and his employer is proud of him. I occasionally hear of employers who say what fools they were in fighting accident-compensation. The new thing certainly did look bad for them at the time. I knew one firm that was led to believe by the claim-agents and insurance experts that its insurance premiums on

account of accident-liability would be raised by the new law from $5000 a year to about $22,000 a year. That probably would have happened at the rate at which accidents had been going on in their plant. The thing looked so frightful that they proceeded at once to convert their claim-agent into a safety expert, besides investing some money in safeguards. The first year thereafter their cost of compensation, instead of going up to $22,000 was cut down to about $2500. They escaped a tax of nearly $20,000 a year on accidents by devoting the same kind of business ability to preventing accidents that they had devoted to manufacturing and selling their product.

It is much the same with the proposed business tax on sickness. We read of the probable enormous cost to industry of compulsory health insurance. It looks like bankruptcy. I am willing to accept the figures. They are presumably based on the existing amount of sickness, although the same insurance experts turn around and say there is not much sickness anyhow.

The explanation is rather simple. They fail to distinguish *philanthropy from business.* If this large amount of sickness is unpreventable then the cost of relief to the sick in a proper humanitarian way will doubtless be very great. But if it is largely preventable then the proper American way is to offer to our business men a chance to make a big profit by preventing it.

I believe our business men have more business ability than those of other countries. They are ingenious, alert, they take chances, and they know how to employ experts to work out the technical details. In these respects they are also quite superior to our politicians and other government officials. It is a curious fact that our insurance experts who try to prove to us that the purpose of insurance is *not prevention but relief*, wish to turn over the prevention of sickness in industry, not to our business men who control the industry, but to our politicians. They give us attractive programs of public health administration, of great and efficient federal, state and municipal health departments, of public health nurses, of city and county sanatoria, hospitals and clinics, of state health inspectors and state and municipal factory inspectors going into the homes and factories and vigorously enforcing a long list of beneficent sanitary laws and health laws and factory inspection laws.

Well, we had a good deal of experience along this line in enforcing the factory inspection laws which require safeguards on machinery as protection against accidents. The factory inspector's job was a very disagreeable and even heroic job. Occasionally he was kicked out by an employer, or, if not kicked out of the factory, was inscrutably lifted out of his job. He had to collect evidence of violations of law, and this evidence had to be sufficient to prove to a judge and jury that the employer was a petty criminal, and the law gave to the criminal the benefit of every doubt. Thus the factory inspector was strung along the rocky career of a detective, sneaking in where he was not wanted, or hustled past the dangerous machinery, and it is no wonder that many of them became blind. Even if they did see things, very little accident-prevention came out of it. The

successful factory inspector was the one who held his job, not the one who prevented accidents.

All of this was greatly changed when workmen's compensation, with its tax on accidents, came in. Now the employer is not treated like a criminal; he is a tax-payer. But,—unlike some other taxes,—he is allowed to make money by evading this tax. So, he eagerly invites the inspector to come in and show him how to escape the tax by preventing the accidents.

But he finds that the old-time political inspector cannot see. What the employer wants is not a detective anyhow,—he wants a safety expert. So he hires his own expert, starts a nation-wide "safety first" campaign, cultivates the "safety spirit" in his employees and in the public.

Then, behold, the factory inspector also begins to be transformed. It is remarkable what influence business men have on government at the points where they can make a profit or avoid a loss. In the midst of even the most corrupt municipal politics they nearly always succeed in having an efficient fire department. I do not know of any workingmen or experts in public or private employment who have a greater pride in their job, or greater efficiency, than the city firemen and fire chiefs. It is because business makes money by them. And so with the factory inspectors. When business men want factory inspectors to be made exempt from politics, because they want them to help keep down the accident-tax on business, then the factory inspector becomes a new man. Government itself becomes better, for government-in-action, at this point, is the factory-inspector-in-action.

Consequently, I offer no objection to the health program of the insurance experts who would turn over sickness prevention to the politicians. I see a great opportunity to improve politics, to enlarge and improve our health departments, and thus to prevent sickness. But I do not see it effective and on a sufficiently large scale until sickness prevention is made a source of financial profit to business men.

This is what is intended in the program of health insurance. There is, of course, also a philanthropic purpose in that program, but that philanthropic purpose is really secondary. The main purpose is the business purpose of making sickness-prevention profitable. There does not seem to be any other way of reaching *all* of our business men, as well as workingmen. Many of our big corporations have begun to take hold of sickness-prevention. They look on it as a business proposition and they resent the name sometimes given to it of "welfare work." The difficulty, however, is, that it is not universal and they do not put enough business ability into it. One reason is that it is too easy to shift the entire cost of sickness over to the workingman and his family. The thing works automatically. When the workman gets sick he just lays off on his own initiative and pays his own bills if he can, and somebody else takes his place.

But health insurance is a follow-up proposition. The employer cannot shift the entire cost over to the workman but must share the cost of doctors and nurses and hospitals and medicines, and must continue to pay a part of the worker's wages even when absent from work. It is a sickness-

tax on industry, coupled with an insurance-scheme in order to spread the tax over the industry and over a period of time. But, since the industry is not solely responsible for sickness, the workman also is required to contribute to the insurance fund, and a part of the tax is thereby spread out over his wages.

If it were not that several large corporations have already voluntarily adopted this plan of health insurance, and set the example, we could not know certainly how it would work. But we do know, from their example, that it prevents sickness. I know such a corporation that has reduced the number of days lost on account of sickness one-half, and the resultant increase in wages and the increase in efficiency of workers has been much greater than the total cost of the insurance.

Another corporation figured that they stood to lose $600 on the average on account of their workmen who came down with tuberculosis, because they had undertaken to provide sanatoria for the cure of their tuberculous workmen and cash benefits for their families while getting cured. They could save, on the average, $600 if they could detect incipient tuberculosis before anybody suspected it. They had voluntarily taxed themselves for the *cure* of tuberculosis, and then saved a large part of the tax by preventing it.

Another corporation, which furnishes physicians and nurses free to its employees, finds that where, six years ago, 75 per cent. of their time was spent in *curing* sickness and only 25 per cent. in *preventing* it, now they spend 75 per cent. of their time in *preventing* sickness and only 25 per cent. is needed for the *cure* of it. This company appropriates $60,000 a year to its medical department, and out of this budget has saved enough money in one year to procure and equip what they call a "Rest Home," where employees below par may go and recuperate at the expense of the company.

Other examples like these might be given. They are convincing and conclusive. When business men, for the sake of increasing the efficiency of their employees, voluntarily tax themselves for the cure of sickness, they end by preventing it. If other business men, not as progressive, are taxed by law for the cure of sickness then business ability will find abundant means of preventing sickness.

Here is the big inducement for a public health program. Not many corporations are big enough, nor far-seeing enough, to tax themselves voluntarily, as these have done, for the support of hospitals and sanatoria, clinics, doctors and nurses. The overwhelming majority of business men must depend on the public health authorities for this assistance. And they will not seriously look for this assistance until they are taxed by law for the sickness that they have not prevented.

The other method of starting a health program is to start it before there is a business demand for it. Mr. Hoffman,[1] for example, says that the "American Association for Labor Legislation could not better serve the interests of American labor than by exerting itself effectively in behalf of the *enactment and enforcement of legislation* providing more efficient

[1] F. L. Hoffman. Facts and Fallacies of Compulsory Health Insurance, p. 45.

governmental supervision and control of the dusty and other trades and occupations predisposing to an excessive morbidity and mortality from pulmonary tuberculosis."

But what does the "enactment and enforcement" of such legislation signify? It signifies increasing the number of petty criminals among business men. It is rather odd that a person who is so greatly disturbed about what he calls "paternalism" and "state socialism" and "class legislation," and the "menace of coercive laws," should find himself calling for laws to increase the criminality of business men. I suppose it is *not class legislation* to make petty criminals out of employers for the sake of their employees, but it is class legislation to tax them on behalf of their employees. I suppose it is not "paternalism" to punish your child for doing evil, but it is paternalism to reward him for doing good. It seems to be not so much "coercive laws" in general that our insurance experts are against, as coercive laws that do not make criminals.

We must have legislation in one way or another if we get anywhere in a health program, and the only question is what kind of legislation shall it be. If we go after repressive legislation which increases criminality, we run great risks of breaking down our health departments through practical politics in the hopeless task of detecting and prosecuting criminals; but if we go after coöperative legislation that offers the inducement of profit to business men if they will take a hand themselves in preventing sickness, we shall strengthen the demand for efficient health departments free from politics. Instead of starting a public health program in defiance of business instincts, we start it by building up a business demand for it.

That America stands in need of such a program we realize now as never before. We have had our first national survey of the people's health. For the first time the medical profession has been organized on a national scale for the detection of disease. Thousands of our young men, at the prime of life when the nation needed them, have been rejected and returned to their homes. Every local community in the nation has been wakened up to the previously undiscovered tuberculosis and physical and mental defects in its midst. Even our most efficient health departments did not know anything about three-fourths or even nine-tenths of the tuberculosis in their jurisdiction. We know now, as never before, how much it means to the nation to start at the very beginning, before people suspect that anything is wrong with themselves. We know that if thousands were rejected at the draft, there must be additional thousands and hundreds of thousands defective in like manner. The draft reached 10,000,000. But there are 100,000,000 of us.

And there we leave it. These boys of ours return to their homes, and nothing is done about it. These hundreds of thousands need a similar medical examination and there are no doctors to examine them. They are no longer immediately needed to defend the nation in war, but they are needed in agriculture, manufactures, mining, and every business and profession, where they can help to make the nation prosperous and happy in time of peace. Health is our first and greatest asset; sickness and poor physique our greatest liability. We have abundant natural resources.

We have a stimulating, even overstimulating climate. We have a more intense competitive business and industry than any other nation. We need stronger men and women to keep up the pace than any other nation. Our wealth is not in our resources and climate, but in our oncoming men and women. The doctor is our greatest producer of wealth. The rest of us can do nothing if the doctor falls down. Schools and education are fruitless without health. Industry carries an unseen but costly expense of inefficiency and absenteeism on account of ill-health and poor physique. We, as a nation, have begun to see the futility of education and industry if we do not have health and physique to build upon.

Shall the doctor rise to this demand and do his part? He may cling to the old idea that his is the art of curing people of sickness and driving out the evil that previously got into them. That is important enough, we do not need to be told. But will he really also get a living sense of what he might do and how he must do it if he would make the modern scientific preventive medicine available for everybody? He can try to bail out the river as it flows through the country, but can he go back to the 100,000,000 unseen sources of the river of sickness?

I do not see that the profession as a whole is in the frame of mind to do it. They will agree with you that it ought to be done, and, more than any other profession or business, the medical profession has a high sense of public responsibility. Other professions look complacently on an increase in the public demand for their services. Lawyers, on the whole, are not eager to cut down the amount of litigation and legal business in the country. Doctors, on the other hand, support all measures tending to improve the public health and cut down the demand for doctors.

But, on the whole, they seem to think that the actual work of improving the public health belongs to the public health departments and not to the practicing physicians. For that actual work requires much more coöperation on their part with the health departments than they seem to be willing to undertake. They are glad to educate the public, and to warn the public, and to approve public health resolutions, but to *organize themselves* as a profession and to do what is necessary in order to examine 100,000,000 people, and then keep them continuously in good health does not seem to appeal to them.

Only in one branch of the medical profession does there seem to be a truly live appreciation of what an outsider would think is preëminently needed. In that remarkable Framingham demonstration the tuberculosis specialists have started out to examine and follow up an entire community in advance of individual complaints. They do it through the coöperation of the practicing physicians, and in order to accomplish this they work through the organized medical society and through the public health department of the city. It means the organization of the community itself, the organization of the nurses, and the daily coöperation of the people, the doctors, the nurses, the specialists and the public health department in a great systematic program of early detection and sickness prevention.

This Framingham demonstration seems to me a far more impressive

lesson than any campaign ever undertaken by the Tuberculosis Association for the construction of sanatoria and the cure of advanced cases. It was natural that the early tendency of tuberculosis specialists, like other specialists, was directed towards hospitals, sanatoria and treatment of advanced cases. What is wanted now is a Framingham demonstration in every state of the union—not fewer sanatoria but more clinics. The people of this country need to learn how to go about it in order to coöperate with the doctors. We never shall learn unless the physicians show us. We know what we want but we do not know how to do it. A Framingham demonstration in every state would show us how, and would waken up the entire medical profession to the methods and possibilities of sickness prevention.

Almost more than any other human ailment is tuberculosis a problem of early examination and prevention. If nearly all of us have been carrying around the germ in little self-made pockets without knowing it, what we want is not merely to keep away from the germ but also to have somebody find out for us as soon as possible whether the pockets are holding out and to tell us what to do to keep them from breaking loose. Evidently in this search for tuberculosis almost every other unseen human ailment can be uncovered. There are other lurking germs, and, most of all, there is the everyday life in the home, in the factory and shop, there is the fatigue, the strain, the food, the shelter, that determine whether or not the body is resisting and overcoming its subtle enemies. That which is done to discover and head off tuberculosis may well discover and head off many of the other ailments and poor physique. The tuberculosis specialist is the least specialized of all medical specialists, for he must take into account all of the social and industrial conditions as well as the individual conditions that predispose to disease. In doing so he must have the coöperation of the entire profession, of the entire community and of the health departments.

The great question in a health program is how to get this coöperation universally. What it amounts to is practically a revised view of the ethics of the medical profession. It seems that, in our great cities at least, those who get the best medical attention are the very rich and the very poor. For these extreme classes medical advice and care are practically free. The very rich do not mind the expense and the very poor are not ashamed if somebody else pays their bills. But the extreme rich and poor are scarcely five or ten per cent. of the total population. The idea of extending free medicine to the other 90 per cent. of the population seems revolting to many physicians.

At the University of Wisconsin we have free medical supervision for 5000 students. No medical fee is charged. The state is taxed for health supervision of the students exactly as it is taxed for their education. As a result, the students consult the physicians on an average probably four or five times as often during the year as they would if they had to pay at each consultation, besides getting the thorough physical examination at the beginning of the year. The result has been a great reduction in sickness, a reduction in absenteeism from classes, and greatly increased stu-

dent efficiency. The loss of time due to bed illness has been reduced 40 to 60 per cent., due to the early treatment of preventable conditions. The frequent consultations have reduced serious illness and its complications at least 50 per cent. During the eight years of this medical supervision the University death rate has been reduced to only one-fourth of the general expectant rate, exclusive of tuberculosis, at the same age period, and even the death rate from the recent "flu" epidemic was believed to be only one-fourth of the general death rate attributable to that cause.

Why should not something like this arrangement be extended to the entire population of the state and the nation? It does for 5000 of the great middle class by taxation what the very rich and the very poor have been getting in the great cities substantially free of cost to themselves.

The principal reason against extending it to the nation seems to be the opposition of doctors. The idea that people generally should consult them without paying for each consultation seems unusual to them. Consequently we have that ethics of the profession which permits heavy fees charged to wealthy patients in order to make up for the free service given to indigent patients. Even if there are no wealthy patients in the neighborhood, the doctor expects to render a considerable amount of service free of charge, or, what is the same thing, to carry a large account of uncollectable bills, and these charges must be met by correspondingly higher fees charged to the people who do pay their bills. It amounts to a tax on the wealthy and on the great middle class in order to give free service to a pauperized class or a class that is not ashamed to dodge its doctor's bills.

As a result, this great middle class of farmers, wage-earners and people with moderate incomes, who will not accept free service, do not consult the doctors and pay the fees until they are compelled by sickness. They hold off, and doctor themselves, and buy patent medicines, until it is too late. If consultations were free they doubtless would consult the doctors, as our students do, many times as often as they now do.

This is what I call prevention of sickness, and this is what health insurance means. It means free consultations, and it means payment of the doctors, to that extent, out of a fund contributed in advance by the people and by the industries of the country. It means free consultations and free examinations and diagnosis supported by taxation through the medium of insurance funds. It means, instead of the physician being compelled to constitute himself a tax-assessor and tax-collector on the wealthy and the middle class in order to furnish the poor with free service after they are sick, that the legislature shall create its own system of taxation in order that the doctor may freely serve all persons long before they get sick.

One of the principal obstacles, as I have just said, to the method of starting a health program by means of universal health insurance is the attitude of many doctors. Doctors have several reasons for suspicion. They know something about the contract doctors. They see mutual benefit societies let out contracts to the lowest bidder to take care of their members in sickness. But these mutual benefit societies have the

old idea of insurance as a philanthropic measure of relief, not the new idea of insurance as a means of preventing sickness. They look on sickness as inevitable and the doctor as a palliative. They get this idea largely from the doctors themselves. They have not yet fully learned from their doctors of the enormous advance that the past thirty years has made possible in preventive medicine. Neither have these mutual societies the business ability nor business inducement to prevent sickness that the employer has. Their purpose is charity, not business. These mutual societies will always have a most important part in a universal health program. They do one thing that neither the doctor nor the employer can do. The very fact that they let out contracts to the lowest bidders indicates that they try to keep down expenses. They assess themselves, and if expenses go up, their assessments go up. For this reason they are careful to watch their members and to prevent them from feigning sickness and getting the benefits fraudulently. In this respect they can do what neither employers nor doctors can do without their help, and this is a reason why health insurance programs propose greatly to enlarge the field of these mutual societies, and to require their members, as well as the employers, to contribute to the insurance funds. But their field is largely the care of unprevented sickness. Not until the business ability of the community is directed towards prevention can we expect that the enormous advances in medical science of the past thirty years will be generally utilized. Then the doctor who bids on contracts will disappear, much as the old-time factory inspector is giving way to the safety expert.

The other important obstacle to health insurance is the idea, not only of insurance experts but also of the public and of physicians and surgeons, that the work of the practicing physician is the art of healing the sick rather than the art of preventing their sickness. Those who are interested in the problem of tuberculosis are the pioneers in revising this mistaken view, for they realize, as others do not, how little can be accomplished without the complete organization of the profession and of the community for the purpose of discovery and prevention. It is fortunate that they have had their own association and their own funds, independent of the profession in general, for it is this that enables them to go ahead in their educational campaign of organization, legislation and prevention, without waiting for others.

The work of the tuberculosis association reveals that palliatives and half-way measures are inadequate. It reveals to us, most of all, the need of a medical profession that shall be in truth the *guardian* of the public health as well as practitioners of the healing art—a profession so organized that the wonderful developments of medical science shall reach every person, for the public health is nothing but the protection of each individual's health.

It reveals to us the need of placing this profession on a business basis instead of leaving its practitioners to the doubtful expedient of financing their calls for charity by taxing it up to the more well-to-do.

The work of the tuberculosis association reveals the need of enlisting

the business ability of the nation in the campaign of prevention. Industry already pays an unseen tax in the absenteeism and inefficiency caused by sickness and poor physique. But not until this tax is made visible in terms of money, where it can be actually seen entering into the cost of manufacture, will business men generally look to the medical profession for assistance in reducing it. When the vigilance of business men is enlisted in the cause, then will the high aims of the new medical profession, which seeks to keep the nation healthy as well as cure its sickness, be more nearly realized. Medicine will more nearly become public medicine, but liberated from politics. Health departments, in every town and rural district, instead of trying to do the work of prevention themselves unaided, will be the public agencies which furnish to the private practitioners the dispensaries, clinics, hospitals, sanatoria, school and county nurses, which make it financially possible for the private practitioners to add the work of prevention to their work of healing.

A truly comprehensive health program is not restricted to any one thing. It means, of course, the cure of sickness. But it means, also, the personal coöperation of every private citizen in sickness prevention. It means the business enterprise of every capitalist and employer of labor. It means sickness insurance. It means increased taxation on unprevented sickness, with ultimately reduced taxation on property. It means, most of all, a medical profession able and willing to bring to the service of the entire nation the marvelous discoveries of the science of preventive medicine.

THE NATIONAL WELFARE

By VICTOR C. VAUGHAN, M.D.

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The most valuable of a nation's assets is the health of its people. In the broad sense in which I wish to present this subject health takes into consideration the condition of the physical, intellectual, and moral man. The world conflict through which we have passed has taught us many and varied lessons, and one of these is that the mind, and even the soul, of a nation may become diseased and lead to acts which endanger the tranquility and interrupt the peace of the world. Some have said that this has been a war of science; others, that it has been a religious war; but none deny that it has been a war in which physical, mental, and moral brutality has played a part unequalled in the history of the world. The "Hun," insane with the lust for world domination, went forth in 1914 seeking a place in the sun and displaying in its most barbaric form the exercise of brute force, strengthened by the discoveries of science and directed by a soul devoid of compassion and without conception of either justice or mercy.

After a struggle of more than four years in which the greater part of the world has been involved and in which modern civilization has been endangered to a degree unknown in history, the insane nation has been arrested, placed in a padded cell, and again—for a time at least—humanity may breathe freely. Many explanations of why the German nation went mad have been offered. To my mind the most reasonable is that it was due to the system of education imposed upon the masses of the German people through successive generations. A great German philosopher once said: "Permit me to educate a generation and I will change the world." In my opinion the behavior of the German people during the world's war is a striking confirmation of the truth of Leibnitz's statement.

Education is best defined as the modification and development of human behavior as a result of the application of various stimuli, and all men may be educated for good or for evil; and in being educated the behavior of the individual community or the nation may be radically changed. In the Volkschule the German masses have been taught for generations a crude barbaric form of religion, the principal tenets of which are obedience to the Kaiser and expectation of the day when the world's chosen people, the Germans, shall dominate the earth. The Kaiser said to his people, "Even if I command you to slay your own father and mother it is for you to obey." If education can lead to such disastrous results when vicious in itself, what might we not expect of national education in justice and righteousness.

As a nation we have shown ourselves quite worthy, and there has never been a time in our history when we could be so justly proud of our citizenship. It is true that we hesitated to do our plain duty for so long a time that we might have been justly accused of having reached a period of national degeneracy. But when we finally were aroused, we raised and equipped in an incredibly short time an efficient army and sent it across the seas and successfully aided our brothers who had been so long in the struggle. The part we have played is one from which we may derive at least some satisfaction in ourselves. However, it is at all times proper and wise to inquire whether we ourselves are free from infection, and what is the state of our physical, mental and moral health.

So far as the protection of our people from infectious diseases is concerned, we have done fairly well. Before the war we had a lower death rate than any European country with the exception of England and Wales, and with these we would run about an even race. Compared with more recently populated countries such as Australia we had a higher death rate. We had fairly accurate mortality statistics from a certain area of our country. In 1916 the registration area of the United States included 70.2 per cent. of the population and 44 per cent. of the geographical surface. These figures mean that in about 30 per cent. of the population occupying about 56 per cent. of the area we had no exact information concerning even the deaths that occurred. While our mortality records, imperfect as they are, have been fairly satisfactory in the registered area there is no part of the country, not even a single city, which can furnish exact morbidity records. It must be evident, therefore, that if we are to cope successfully with the infectious diseases our mortality records must be extended to every part of the country and greatly improved in quality; and we must have reliable morbidity records from the whole country.

The one thing above all others that is fundamentally essential in all efforts to improve the race is education. The founders of this nation seem to have been fully aware of this at all times. In the Ordinance of 1787 which provided for the organization of the Territory of the Northwest, then a wilderness, now the heart of the nation, we find the following words: "Religion, morality and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged." The spirit of these words has continued with the generations which have occupied, enjoyed, and developed the region for the growth of which the wise men of more than a century ago were making provision when they wrote them. This land has come to be known today as "the valley of democracy" and it supports the best system of state education in the world. From the primary schools through the secondary to the state universities with their professional schools the young of both sexes may walk the road of self-improvement. The toll is light and there are no class distinctions and no special privileges among those who travel. Thousands from moderate and humble homes have taken this road to the acquisition

of knowledge because it is the only way open to them; other thousands from more costly homes may be seen on this road because they believe it the best; and as the poor and rich journey, clothed in substantially the same uniform, feeding upon the same rations, assigned to the same duties, there is as a rule the greatest comradeship among them. In my opinion our system of state education is the greatest bulwark of democracy in our possession. Lest I be misunderstood, I desire to say that I include our endowed institutions of learning which owe their existence and support to men of wealth who have patriotically from their surplus relieved and assisted the state in bearing the financial educational burden. The spirit, and to a large extent the practice, is the same in all. The state-supported and the endowed schools have equally and without reserve placed themselves, their faculties, and their students at the disposition of the nation in its hour of need. The intelligence possessed by the masses of our people and acquired largely through the efficiency of our schools broke the morbid lethargy which restrained us during the first years of the great war for liberty and in behalf of civilization, and enabled us to place a fighting army of nearly a million men at the disposal of our war-weary and worn allies at the moment of their direst need. The results reached in so incredibly short a time and so satisfactory in every detail have saved the world, we hope for all time, from the complete degradation planned by a nation led into insanity by a radically different system of education.

May one dare at this time and after such a demonstration of the efficiency of our system of education to say that he deems it lacking in many particulars and in need of marked and radical alterations? Our experience in the mobilization of troops by the draft laws shows that thousands of our young men have not the rudiments of educational training. The causes are multiple. Many have been too poor to get an education, as cheap as it is in this country. They have dependents even before they reach the age at which they can reasonably be expected to support themselves. They are chained to the farm, mill, factory, or mine, and are in reality, if not legally, in servitude. Some are born, reared, and die in poverty. Some live in an atmosphere of ignorance so dense that they have no conception of the need of education. The desire for food one has never tasted cannot be strong enough to lead to effort sufficient to procure it. I regret to say that some are born into and pass their youth in communities so debased by crime that they never feel the touch of decent living. We boast of this as an era of civilization, of our land as the home of the free and the brave, and we fail to recognize the fact that our courts are busy and our jails and prisons are full. All this should be remedied, and this will be done only when we fully realize that equal opportunity for development into good citizenship should come to all, at least so far as human endeavor can bring it to pass.

My first indictment against our system of education is that it does not reach all classes, and my second is that among many of those reached it fails in many particulars. This is true of some of those who have availed themselves of its highest benefits. I have been much impressed

with the inability of many university graduates to render service to their country even when highly desirous of doing so. They possess the rudiments of much learning, but they know nothing well enough to apply it. They are like a limbless man at a fire; indeed they are in a worse plight because they cannot even tell others how to do it.

Fortunately this does not apply so largely at least to our scientific and professional men, for it is through their knowledge and effort that we have won the war. Educated men in Congress without reference to party affiliation framed the most effective and equitable draft law ever enacted. Able lawyers under the direction of General Crowder put this law into practice most wisely and expeditiously. The drafted men with scarcely a grumble and for the most part with pride submitted to the just decisions of the local boards. Civilian architects and builders rushed to the aid of the Construction Department, and within a few weeks numerous cities with ample buildings, modern roads, electric lighting, steam heating, safe water supply, adequate sewage disposal, and transportation facilities came into existence as if by magic and were soon occupied by the noblest lads any nation ever put in khaki.

Secretary Lane says: "Eight and a half million persons in the United States over ten years of age cannot read a newspaper, billboard, car card, sign, booklet, or letter in the American language. Five and a half millions of them cannot read anything in any language." Add to the above quotation the following figures furnished by Colonel Mock who says that in 1917 there were in this country 875,000 industrial accidents leading to more than four weeks of disability. In these accidents 74,800 met with loss of limb or eye. Of the industrial accidents in that year more than 28,000 proved fatal.

It is impossible in considering the future welfare of our nation to overlook the question of immigration. On the whole, sons of foreign-born parents and many of those themselves foreign-born have shown themselves as worthy of citizenship as the descendants of those who came on the Mayflower or followed the fortunes of Captain John Smith in Virginia. Our casualty lists speak for themselves in no uncertain terms along this line. But is there to be no interruption and no greater control of the great stream of immigrants which has poured into our country through Ellis Island during the past quarter of a century? The details of the local draft boards should be carefully studied in considering this question. On the whole, it was found that about one-third of our young men between 21 and 31 years of age were unfit for military duty. If those who proved unfit after trial were added, this fraction would be much larger. This is the real test of any man's fitness for military service. The number of unfit under any estimate is too large, and indicates lack of proper physical training, or the presence of unsanitary environment, or the inheritance of marked physical defects. Doubtless all of these are factors contributing to this delinquency. If the average physical condition of the young men of Alabama with its large Negro population is better than that of Pennsylvania with its large foreign white population, and if it can be shown that these relations are cause

and effect, then it is time that greater restriction should be placed on immigration.

In order to save time and to condense my statements as far as possible, I propose the following theses which should have thorough consideration by those interested in the national welfare:

1. The youth of the country on reaching a certain age, to be determined after mature deliberation, should be drafted into the country's service.

2. The only exemptions should be the mentally incompetent, and these should be so segregated that the propagation of their kind would be impossible.

3. Those suffering with physical defects should be classified, their defects remedied so far as possible, and the training to which they are to be subjected should be adapted to their individual needs.

4. The period of training should cover not less than two years, and may be continuous, or broken into terms.

5. This training should be disciplinary, and to this extent military, but the primary and principal purpose should not be the preparing of men for the fighting line but for good citizenship.

6. The training should include the physical, mental, and moral man.

7. Physical development and the practice of personal and community hygiene should be the fundamental thing in all this training.

8. Instruction in the prevention and eradication of infectious diseases should be given by practical demonstration as well as by text books and lectures. Personal hygiene must be practiced in daily life. It is largely a matter of habit.

9. The English language must be taught and its correct use demanded of all at all times.

10. The history of our nation, its growth and development, its relation to other nations in time of peace and of war, its material resources and its ideals, should hold an important position in the curriculum.

11. The obligations and duties of citizenship should be impressed upon all.

12. To those lacking in training in the following subjects proper instruction should be given: mathematics, physics, chemistry, biology. The last mentioned should include the influence of heredity and environment upon the physical, mental, and moral man.

13. Each individual should be given a substantial start in some industrial trade or profession. He should know how to take care of his own body, be a clean and intelligent citizen, and be ready at all times and under all conditions to render effective service to his country.

14. These training schools should be without expense to the individual. He should be housed, clothed, fed, and instructed by state aid, and his family should be moderately compensated, in case of necessity, for his time.

15. When he completes the courses at the training school he should pass into a reserve corps and should carry a qualification card showing his grades in physical, mental, and moral fitness.

16. In the reserve corps he should be examined at intervals of two years

until he reaches 45 years of age. At these examinations his qualification card should be reviewed.

17. From the time of entering the training school through his continuance in the reserve corps he should at all times carry on his person an identification card which he should present at the request of a civil or military officer.

18. Both preventive and curative medicine should be sufficiently socialized to be at the service of all citizens. No ill which human skill can relieve should be permitted to continue among our people.

There are to-day thousands of good people, some inside, some outside of the medical profession, who have the highest regard and the greatest confidence in public health work. In fact, all intelligent people recognize that that government is the best which gives to its citizens the greatest length of life with the greatest freedom from disease. The trouble is that we are without a leader. We are without knowledge enough to enable us to do what we have in our hearts to do. There are in this country to-day many public health agents. All are striving to do good, but there is a lack of coöperation and unity of purpose. Shall this great health work be based upon Federal, state, municipal or local lines of activity? These are questions, the solution of which causes thinking men to hesitate. We know that the wagon is stuck in the mud. There are enough willing hands to pull it out, but one is of this opinion, another of that. One wants to back a little and then give a big push forward. One thinks that we must turn to the right, another is equally certain that we must turn to the left. We are in a dilemma and we do not know which horn we should take hold of or which way we should pull. Probably we shall gain time by consulting together, by using our brains as well as our muscles.

This is what the Council on Public Health of the American Medical Association is attempting to do just now. It is seeking the opinions of those whom it deems wise, and it is the hope of the members of this Council that soon some unity of action can be decided upon.

No nation can be great unless it be composed of healthy people. Any nation can make itself great if it possess intelligence and the will to apply this intelligence. Let us see how much intelligence we can muster, what this intelligence will advise and then let us all pull together to make this country the greatest, best and most pleasant to live in of all the lands in the wide world.

EXPERIENCE ABROAD, SHOWING RELATIONSHIP BETWEEN TUBERCULOSIS AND A GENERAL HEALTH PROGRAM

By HOMER FOLKS, LL.D.

New York

I had an opportunity recently to traverse Serbia from the south end to the north. I passed through 350 miles of villages and towns in which the buildings on the main highway almost without exception had lost practically all their windows and doors, when the Germans retreated. If this particular church building had been on that line I might try to keep you longer to-night than I shall do under the present circumstances. But I would like to suggest for consideration that we invite a delegation of the German army to pass through the churches of the country in the spring of each year.

I am not going to speak of France. At the end of the war, I was asked by the Red Cross to make a survey of certain other countries as to their needs at that time, and I shall make a few more or less reminiscent comments on things that I saw and heard about in Italy, Greece and Serbia, more especially in Serbia.

When I was asked to consider making a sort of inquiry or survey of conditions, it occurred to me that the most valuable asset of a nation is the health of its people. I thought I could put into my survey a good deal about public health, and I planned to take with me two experts on the subject. I was fortunate in having Dr. Godfrey of the State Health Department of New York, an epidemiologist, bacteriologist, scientist, and what not, and also Dr. Dublin, a statistician, who can take a table of figures from any country and tell you all the facts about that nation from the year one down to the present, and forecast its future.

I will sum up my conclusions at the outset because you may not be here when I get through. I should say, first, that the agencies which those countries had for the prevention of disease and the promotion of health and the preservation of their citizens, and they had some, all of them, have substantially disappeared. Secondly, starting with nothing to work with, they are confronted with the most serious conditions from the point of view of conservation of human resources, of wasted human resources, and of the presence of serious dangers, that we have ever known. And third, that although some of those countries are permanent headquarters for some of the great epidemic diseases that from time to time sweep over the world, the big job in even those countries is to deal with the same old friends that we have been dealing with here—tuberculosis, infant mortality, and venereal disease; the epidemics that stay with you

all the time, to which you get wholly accustomed so that you do not realize how serious they are.

Turning to Italy, and speaking for a moment of tuberculosis, our special interest there, Dr. Dublin had already secured a good many of the figures. Tuberculosis had been decreasing, something was being done about it, and in about 25 years it had diminished 40 per cent. up to 1914. The figures are available for 1915 and 1916. During those two years it increased about 25 per cent. That is, the progress of a decade was lost in two years. The large cities increased another 17 per cent. in the next year, 1917. What happened in 1918 we do not know, except in a number of cities where the record is so bad that it cannot be thought to be typical and for that reason I will not mention it.

Malaria has long been an extremely serious thing in Italy. You may perhaps have read something about the wonderful work done by the Italian Government for the control of malaria. That had met with a very large degree of success. It is a reportable disease; both the deaths due to malaria and the cases reported had had an extraordinary diminution. At the outset of the war money was scarce, the drainage works and so on could not receive their appropriations, and quinine could not be found. Almost immediately, it is astonishing how quickly, malaria jumped back to where it was a decade ago. The reports from some parts of Italy show that an astonishingly large percentage of the entire population developed malaria during the very short period of the war.

Typhoid fever also took the back track and a decrease was turned into an increase. Infant mortality also increased very noticeably. In certain cities for which the figures for 1917 and 1918 were secured, they too are so astonishing for the year 1918, when the food shortage became very acute, that I hesitate to mention them; we hope and trust that they are not typical of the rest of Italy.

Influenza was extremely serious in Italy. I hesitate again to allude to the figures which come in regard to the number of deaths from influenza in Italy. It is evidently far worse than anything we had in this country. The population of Italy was increasing rapidly before the war. It diminished almost equally as rapidly during the latter part of the war, and to-day she has, I would not say how many, but very many fewer people than when the war began.

From Italy we went to Greece. Greece is a hard country to find out anything about. They never had any vital statistics, except for the cities, and the latest available for those was for 1908. It is almost as bad as a considerable part of America. In fact, repeatedly when we struck something that was particularly bad, Dr. Godfrey would say, "Yes, that is awfully bad; it is almost as bad as—." I will not mention states—one of our southern or eastern, or northern or western or central states—as the case might be. But we could go a little bit by some surface indications, and by the facts before the war. The city of Athens, the former centre of culture of the world, is in a serious condition. In 1908 one death in every six was due to tuberculosis. Typhoid fever is very bad in Athens, and it is obvious why it should be. They still get their

water supply from an aqueduct that was built by one of the Roman emperors. For a hundred years or so they have been considering enlarging it and they have the plans drawn. It would be easy to enlarge it, but it was put off, when they were about to go ahead with it, by the cost of the war. They were putting into effect an anti-malarial campaign, because the malaria of some parts of Greece would make Italy look like a health resort. The armies that went to Salonika found this out, for the mosquitoes that had been fed up for centuries on the Turks and the other people out there fell upon the British and the French. They made them build enormous hospitals. The mosquitoes filled these hospitals and sent thousands of soldiers back to France and England invalided. One of the first requests made of the Red Cross in France was to build a large hospital for malarial patients returned from the Balkans. That is only a suggestion of the malaria developed in the armies of the Allies which even endangered Allied success in that region.

Now, to hurry on to Serbia, because that is really the country that I saw most of, and is the country which has suffered most from the war, in my judgment, of all the Allied countries that I saw. I do not know about Poland and Asia Minor. Certainly it is a very interesting country. The northern part, as you know, borders on Austria, and the southern part was Turkey until just a few years ago, in 1913, and was very Turkish, and still is very Turkish, and public health has never been heard of in any Turkish country. The northern part was in contact with Austria, and the medical students of Northern Serbia were educated in Vienna and Berlin and Paris. There were some very well educated doctors in Serbia at the outbreak of the war. The vital statistics for the northern part were quite complete and the facts are fairly well known. They had less than 400 doctors altogether. It is a country of 5,000,000 people, that would be about one for 12,000. A great many of them were located in the city of Belgrade, which is where the rich people live, and the other parts of the country got along as best they could. That is also true of Greece. The best doctors are very largely in Athens. One hundred twenty-five of Serbia's doctors died of typhus in the epidemic during the war. A good many more died from other causes during the war and during the great retreat, so that there are about one-third of that 400 left now, and the great part of those are still mobilized and are with the Serbian army in what was Austria-Hungary, or in the capital city of Belgrade. So the great part of this population of 5,000,000 people is almost without medical service except such as a few English hospitals and a few American doctors, and a few old men, or a very few demobilized men are able to give. They had a series of public hospitals before the war; they had almost a system of public medicine. About half of the doctors were employed by the government, by the counties, as we would call them, or the wards or the cities, and each of the departments, that is so to speak, each county, had a general hospital. What they had they made good use of and the tradition there is that the medical service is for the benefit of all the people and the people have a right to get it, and are expected to pay for it if they can. But those who do not pay taxes

are not expected to pay for medical care. There were no Serbian hospitals for civilians when I was there. There was practically no provision for taking care of the sick, except that for the Serbian army.

We know about tuberculosis before the war in Northern Serbia, the part that was not Turkey up to 1913. They had a tuberculosis death rate of 324 per 100,000; that is the whole country. That is about twice what we have, but Belgrade, which is an extremely attractive city, with a wonderful situation at the junction of two great rivers, which ought to be as healthy a place as there is in the world,—it is incomparably superior in its location to Paris or London, or almost any of the big cities,—had a tuberculosis death rate before the war of 720 per 100,000. Serbia had a bad time during the war. It was practically annexed to Austria; it was back of the lines and therefore it suffered from all the effects of the blockade. Those of you who heard Dr. Miller to-day will recall he reported that, according to the figures he had, tuberculosis did not greatly increase in England or France,—that is, in unoccupied France, —but greatly increased in Belgium. Serbia was Belgium without Hoover. Serbia suffered all the effects of the blockade of the Central powers, plus having its food supply taken by the Bulgarians and the Austrians and the Germans and sent home to their families. So that Serbia was terribly hungry during the war, although it is a country that normally exports food. Of course, the Serbian officials were all away and such records as were kept, were kept under Austrian auspices, but they published an extremely interesting report on health conditions in Belgrade and in Northern Serbia, and they gave some very interesting statistics which have the appearance of being carefully prepared. I do not guarantee their accuracy, but they were not published for us but for their own use. We found a copy and according to that copy the tuberculosis death rate in Belgrade in 1917 based on the population as nearly as they could get it from their food cards and from a military census was 1483 per 100,000, or twice what it had been before.

When we went into Serbia we first met the public officials, the mayors and the leading citizens, and naturally I asked them about various things, food and so on. When I asked if there was any tuberculosis in Serbia, they all said, "Oh, no, there is no tuberculosis to speak of. In Serbia we have never had much tuberculosis. It is a beautiful, healthy country; we have the mountains on the east and beautiful mountains on the west; it is an open rolling country with a wonderful climate; we could not have much tuberculosis." And they believe that to be true. They were just like the local officials of New York counties and elsewhere who believe that to be the case. But as soon as we met a few of the experienced Serbian physicians who were connected with the Serbian military hospitals, and asked them about tuberculosis they said, "Oh, yes. It is known as *the Serbian disease.* Oh, yes, lots of it, and a great deal more since the war." Their statements were borne out by all we saw.

Infant mortality in Serbia has always been very high, and during the war mortality has been high not only among very young children, but among all children up to five. Although we have no figures, the uni-

versal testimony of those who know something about it was that child mortality was exceedingly serious during the war.

As to the birth rate, I forgot to say that in Italy the birth rate fell off fully one-third. In a good many parts of France it fell off 50 per cent. You will recall that all of Serbia was occupied by the enemy. The mobilization of the Serbian men was very complete and they were all driven out of the country. Now, to make a long story short, the midwives were quite unemployed in Serbia. The birth rate was a disappearing factor in the life of the nation. Again, figures are unavailable, but I asked a very good physician in Belgrade, of general practice, an old man, how much it was. I said, "Would it be as low as 40 per cent.?" and he said, "Very much lower." I said, "Would it be 20 per cent.?" "Oh, I do not think it would be as much as 20 per cent." So you can almost say that during those four years the children born in Serbia were a negligible number. I hurry over various other things, typhus, influenza, which was extremely bad, and venereal diseases, which are extremely bad in certain districts and have been for years. The tradition is that there was a Russian army in residence for a certain length of time, and practically everybody acquired venereal disease, and practically everybody has had it ever since. As to total losses, Serbia was a country with a rapidly growing population, close to 90,000 net increase each year. The military losses of Serbia were extremely high as all the world knows, but they are but a fraction of the reduction in the civil population of Serbia. The biggest item undoubtedly in the reduction of the population is the relative absence of births, and the great number of deaths among children. I should suppose that the estimate which is made by those who have given it considerable thought, that she has lost all the normal increase during those four years and in addition has lost a fifth of her population, is not far from correct. In other words, having been a country of five millions, she is not more than four million now. Of course, only a census could tell us, but from all the things we see and hear from many different sources that seems a reasonable estimate.

The opportunity for public health work in Serbia, to my mind, is one of the greatest opportunities in the world. The Serbian characteristics fall in with that kind of thing. They are very interesting people; they are like the French in some respects. We had a most interesting time with public health exhibits in France. People went to them in great numbers and they read them; they did not just look at the high spots, they read them all with care, and the Serbians would just love that kind of thing. They take to public movements, to political, and public affairs of all kinds. They have a tradition of organized medical service. They have every natural opportunity. They have already, and have had since last December, a ministry of health for the new kingdom of the Serbs, Croats and Slovenes, but we cannot help them by simply sending money, or good will, or more territory, or more democracy or anything like that; we can only help them really and effectively by sending people who know how to do it, who can establish and carry on movements for the conservation of the human resources of Serbia, and who can bear the cost of those

things for a time and show them how it can be done, just as has been done in France. I should think it a mistake to begin with one specialized thing like tuberculosis, or even infant welfare; it would be much better to begin with the whole subject of public health and the conservation of their human resources.

One more thing and I am finished. There is a rather new problem in public health in Europe, that nobody, to the best of my knowledge, is really doing anything substantial about. For some weeks or months, there have been refugees going back to devastated regions where the houses are all shot down, or pretty much so, where they are in ruins, and where at this time those people are living in cellars and basements and sub-basements, or putting up a few pieces of boards or a few pieces of corrugated iron or any wreckage they find on the battlefield, and just getting a place to stay a little while. They think that before winter they will have a house to live in, but you and I know that they will not. They are going to have to spend a winter, if not two, in that kind of thing. There are two million people of that kind in France, around 600,000 in Belgium, 500,000 in Italy, and 150,000 in Greece, saying nothing about Poland and Roumania and Russia. In other words, six or seven million people, women and children, not soldiers, not receiving the adequate rations of food of the armies (whose health was kept up in spite of exposure), are going back to live under conditions which to all appearances and from all considerations we have previously taken into account, we would say are as unhealthful as anything in the world could be, dark and damp and dirty and with absolutely none of the ordinary precautions for sanitary protection. What is going to happen to those six or seven million people is one of the most interesting things to be disclosed in the history of the world within the next few years.

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X-RAY STUDY OF ADVANCED TUBERCULOSIS OF THE LUNGS WITH AUTOPSIES

THE DEGREES OF DENSITY OF GENERAL HOSPITAL No. 17*

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FROM our teachings we had the following general ideas in regard to the significance of different degrees of density on x-ray plates of tuberculosis of the lungs: first, that the greater the density the greater the amount of fibrous tissue in the lesion; second, that a thickened pleura is capable of showing very marked density; third, that massive caseation shows less density than fibrous tissue and even less than many thickened pleurae, in fact often shows only mild semi-translucent snowstorm effects; fourth, that scattered tubercles are visible practically only in the greater evidence of the normal lung detail; fifth, that normal lung detail is produced by bronchial tubes and blood vessels; sixth, that annular figures signify cavities and their absence the absence of cavities.

Confidently we read our plates with those ideas in mind. Six autopsies occurred and we compared the carefully sectioned lung with our reading. It failed to correspond in so many particulars that we set about a special study and proceeded to read our x-ray plates not from previous instruction but from the comparison of the autopsies.

We sectioned the lungs most carefully, compared the plate with every part and tried to determine what each shadow meant. In addition, in order to discover how much of a shadow different normal and pathological tissues produced, we x-rayed a number of tissues separately and created a number of conditions in the way of cavities containing both air and fluid, localized caseous consolidations transferred from other lungs, watery, serous, blood and purulent effusions covering the lungs, and conditions representing thickened pleura over both human and pigs' lungs. We studied the lungs both within and without their thoracic cage, with and apart from the heart, in cut sections and under every circumstance which our imaginations could devise. Our plates were all stereoscopic.

We found the study of pigs' lungs particularly instructive from the fact that the bronchial tubes are larger and extend nearer to the periphery, thus making them easier of recognition by the x-ray.

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We made a number of x-ray pictures of the following structures:

1. Normal pericardium
2. Two thicknesses of pericardium
3. Small piece of collapsed lung with tubercles
4. Small piece of collapsed emphysematous lung with tubercles
5. Small piece of collapsed lung with tubercles, the whole covered with pericardium
6. A piece of lung with ordinary visceral pleura on side so that the pleura would be seen in optical section
7. Piece of lung with small cavity; cavity was cut in half, cut side uppermost and penetrating about one-half the lung tissue
8. Piece of blood vessel about the size of the adult carotid and one-tenth of an inch deep in optical section
9. Piece of blood vessel empty and another filled with blood in longitudinal section
10. Piece of adult trachea about one-eighth of an inch deep in optical section
11. Piece of bronchus in longitudinal section
12. Longitudinal section of dividing bronchus at hilum filled with blood.

We learned that:

First. Even a dense thick fibrous membrane, like pericardium, interferes very little with the ray and casts almost no shadow. This is true even when it is doubled. We were not surprised to find, therefore, that thickened pleura evidently apparent at autopsy could not be detected on the plate. Pathological conditions in the lungs are visible by their shadows only when the air content in this area is much less or much greater than that neighboring. We can imagine a pleura sufficiently thickened over one lobe to so compress it as to diminish the general air content and thus produce a shadow, but this would require the pleura to be probably a quarter of an inch or more in thickness which never occurs except over a massive lesion when the thickened pleura would be lost in the lesion itself.

Second. Tubercles to the size of a pea in collapsed lung tissue are not differentiated, the whole mass appearing of equal density. Therefore, it is not the caseous debris *per se* which makes the shadow, but simply the comparison of the air content.

Third. An artery the size and thickness of the carotid casts so little shadow even when filled with blood that it is likely the blood vessels *per se* have little or nothing to do with the hilum shadow or normal lung detail. The hilum shows up not on account of specific structures, but merely on account of the lack of air content.

Fourth. The trachea and bronchial tubes cast a slightly more dense shadow than blood vessels, and from the study of bronchial tubes standing alone and in the pigs' lungs, we believe that they are entirely responsible for normal lung detail.

Fifth. A cavity in the lung becomes evident not on account of the density or thickness of its wall, but on account of the air in it, and the

air usually so rarefies the tissue before and behind as almost to obliterate it. The cavity of the trachea, for instance, so modifies the dense tissue of the sternum and spinal column between which it lies that it is seen through them. As a consequence, it is usually impossible to diagnose whether the condition before or behind a cavity in the lung is normal or pathological. On account of this very rarefaction, however, a cavity sometimes intensifies special things, which are smaller in extent than the cavity itself, so that we feel confident, though we never had the opportunity to try the experiment, if a bladder filled with air were placed on the outside of the body in front of an imbedded metallic substance, or possibly a kidney or bladder stone, it would rarefy the tissue about the stone so as to make it more apparent. Since we wrote this sentence, we have learned that others have done this with success. In addition, no matter how thick the wall, a cavity never shows contour and always appears as a ring.

To learn whether or not the inflammatory elements in the wall of a cavity are of importance in the production of the wall seen on the x-ray plate, an x-ray was taken of intestinal ulcers:

1. An unopened piece of intestine with ulcer. The plate showed only the outline of the intestine with practically no indication of the ulcer.

2. Piece of intestine opened with ulcer uppermost. This showed the ulcer in ill defined outline.

3. Piece of intestine opened with ulcer covered with barium. This showed the barium covering the ulcer as well as the barium accidentally dropped over other places but did not outline the ulcer.

The same three pieces of intestine were also covered by one-quarter inch of rectus muscle. All showed the intestine in faint outline and the last the barium in the intestine. In other words, the inflammatory elements *per se* are not the cause of the cavity wall shadow.

Artificial conditions were also produced in the following ways:

1. A pig's bladder was blown up, one inch and a half in diameter with air and introduced into the center of a pig's lung. In spite of the thick walls of the bladder and the fact that it was not blown up to a great degree allowing the walls to fall in folds, the plate showed simply the typical appearance of cavity with ordinary walls. In other words, in spite of the muscular and connective tissue in the bladder walls, it was the air content which was particularly visible, rather than the wall itself. Immediately below where the bladder was introduced there was a triangular space made in the lung tissue. In spite of the fact that this had no definite wall except above, where the bladder crossed it, this cavity showed up quite as well as the bladder cavity.

2. A small three-quarter inch square of collapsed human lung containing scattered tubercles was introduced into the middle of a pig's lung. This showed up as a single mass, the tubercles not being differentiated. The density was homogeneous and faint, comparing about with single rib or fibrosis density. It was sharply defined and showed the exact shape of the piece inserted.

3. A mass of caseation one inch in diameter was introduced into the

center of a pig's lung and showed slightly greater density than the preceding. It was about as dense as heart density, though slightly less homogeneous. The edges were not so well defined and shaded off into normal lung. In other words, though caseation is more dense than collapsed lung and showed it on the plate, the margin of the caseated mass, due probably to slight differences in the pictures, was less clear cut.

4. Pigs' lungs were infiltrated with barium sulphate both by insufflation after death and by attaching a bag filled with barium over the snout shortly before death, with the idea that it would be easier to trace the bronchial tubes. Subsequent studies proved these experiments unnecessary since the bronchial tube in the pig is so evident throughout its course. Its shadow is manifested on the plate as a line of lessened density varying in size with the calibre of the tube, bounded by two white lines. We do not agree with the description that a bronchus is indicated by two flat bands of great density separated by an area of slight density, since slight density would convey the idea of greater density than normal when in reality it is less. On account of the air in the bronchial tube, it is often noticeable that when a bronchial tube passes in front of or behind an object the density of which corresponds with or is greater than the boundary line of the bronchus, the bronchus is still traceable as an area of lessened density, but the boundary lines are effaced. It is interesting to note that the barium in both cases confined itself almost entirely to the upper portions of the lungs, confirming the fact described by others that inhaled particles are carried naturally to the apices.

5. The bladders of three pigs were filled, one with water, one with blood, and one with air, and x-rayed. The density of the water and blood was exactly the same. The bladder filled with air showed as a clear space bounded by a narrow white line.

6. The bladder filled with water was flattened out to one inch in thickness, placed before a lung, and x-rayed. It showed the density of heart with lung detail visible behind it. Ordinarily a pleural effusion fails to show lung detail behind it, because, in addition to casting its own shadow, it compresses the lung, thus obliterating lung detail and increasing the shadow. The faint shadow immediately above a pleural effusion, commonly stated to be due to thickened pleura, we believe due to upward compression of the lung.

7. A bladder filled with pus was placed in front of the left lung, and a bladder filled with serum behind the right lung, and the whole was surrounded by a layer of skin and fat three-fourths of an inch thick and x-rayed. The pus showed slightly denser than the serum, and not quite so dense as the heart.

From these studies, we thought we determined first that lung detail so called is due practically entirely to bronchial tubes, for if due to blood vessels it would be obliterated by the bladder filled with fluid. Moreover, their definition is due less to their walls than to the rarefaction of the tissue above and below by the air content, in as much as a sinus without walls through normal lung tissue shows up practically as well. We do not dispute the anatomical fact that the blood vessels accompany the

bronchial tubes, but only that they do not participate in the production of normal lung detail shadow.

In general it is evident that the hilum shadow is made up of bronchial tubes, bronchial glands, arteries, veins and the massive connective tissue at the root of the lung, but it is impossible to decide how much is due to each structure, since the shadow is the result of the absence of air in comparison with the lung rather than the presence of individual structures. The hilum shadow more than anything else demonstrates the necessity of having the plates absolutely uniform as to time exposure, distance, milliamperage, etc., for on some plates which appear practically perfect the bronchial tubes passing through the hilum are evidently shown, while on others apparently equally perfect they are not shown at all, and from this we judge that correspondingly large features might be missed in the lung due to similar unconscious differences in penetration.

It appears that when the lesion extends from the anterior to the posterior aspect of the lung, the plate will show it, but if the lesion is reasonably localized with considerable normal tissue before or behind it, or both, it may be entirely lost.

The x-ray shadow is produced neither by caseation, nor fibrosis *per se*, but is merely a matter of more or less air than normal. Any sort of a consolidation of the lung tissue produces shadow, but the shadow is invisible if the consolidation is less than a certain size, probably 1 cm. in diameter, though multiple masses of even less size may produce shadow if these masses overlap, thus producing an optical mass of greater size. Cohn[1] and Sewall and Childs[2] assert that new tubercles cast no shadow, and whatever shadow is visible is due to the vascular engorgement about them. Our experiments prove that anything lessening the amount of air casts a shadow, but the shadow of new tubercles may be, and almost always is, too small to be seen. The vascular engorgement may be sufficient to make the shadow visible. From the numerous plates of lobar and broncho-pneumonias recently made, we know that congestion of the lung does produce a shadow, though the amount of congestion necessary has not been determined. From our studies we believe that a few widely scattered small tubercles are invisible, but that a large number become visible on account of their overlapping in optical section. The assertion of Sewall and Childs that lung detail is entirely and of Baetjer[3] that it is mostly due to blood vessels does not seem justified.

All of our autopsied cases showed both lungs so infiltrated that we had no opportunity for the study of the early typical apical lesions on which so much of Dunham's excellent work has been done; in the study of our advanced lesions, however, we were forced to disagree with some of the prevailing ideas relative to the significance of various densities, and on this account have formulated our findings into the following series. On account of the unavoidable differences in technique of different plates, we thought it worth while comparing these densities when possible with something on the plate, so that in case the plate were over or under exposed a comparison would still be at hand.

The following is the working scale we formulated:

0° Pneumothorax. Perfect clearness.

1° Compensatory emphysema or cavity, the latter being usually more homogeneous.

2° Normal lung.

3° Scattered tubercles. Slight mottling, usually seen neighboring an extensive lesion.

4° Fibrosis. Density of moderate degree, simulating the density of a single rib near the base of the lung.

5° Numerous scattered tubercles or caseous broncho-pneumonia. Density of greater degree than fibrosis in flaky or cottony areas resembling a thick snowstorm. About the density of crossing ribs near the base, but not so homogeneous.

6° Massive caseation. Homogeneous density like frosted glass. Simulates heart density. Fluid cannot be distinguished from caseation except by location and demarkation.

7° Calcification. Bright speck, greater than the density representing sternum, heart and spine over one another.

In spite of all this study and differentiation, however, our most recent reading of the x-ray plates of which we have autopsy protocols, after sufficient time had elapsed for us to forget the autopsy findings, was only 50 per cent. perfect, 25 per cent. fair and 25 per cent. wrong. These failures were not, of course, failures in the diagnosis of massive lesions, but in the differentiation of fibrous tissue from caseation, the diagnosis of occasional cavities and the presence or absence of a few tubercles. The majority of cavities show annular figures and the majority of annular figures signify cavities, but the autopsy sometimes showed no cavity where there was a figure, and sometimes a cavity where there was none, and the number of them was sufficiently great to make the diagnosis very uncertain. In other words, we are still far from perfection; in fact, our x-ray readings are yet not as satisfactory as the original diagnosis from physical signs.

We regret that we did not see the article by Sampson, Heise and Brown[4] before our autopsies, since their explanation of the annular shadows as localized interlobar pneumothoraces seems as if it might cover a certain number of cases. As far as we know such localized pneumothoraces have never been found at autopsy, and their presence or absence will require special sectioning of the lung with these in mind.

It has been commonly stated (Barjon[5], Honeii, Brown and others) that though the x-ray usually fails to show a small lesion at the apex as definitely as physical signs, any lesion which it is capable of showing it usually demonstrates as larger than the physical signs outline it, and the larger the lesion the more true this is. This statement has been repeated such a number of times that most clinicians believe it, yet we have never seen it based on the scientific grounds of comparison. If only the superficial examination of haste and inexperience is taken into consideration the statement is undoubtedly true; that it is far from true in comparison with the specialist's examination is evidenced by our autopsy findings compared with the physical diagnosis and x-ray findings.

The following table shows this comparison:

	Perfect	*Fair*	*Wrong*
Physical Diagnosis	62 per cent.	28 per cent.	10 per cent.
X-ray Diagnosis	43 per cent.	19 per cent.	38 per cent.

We wish to reiterate that those wrong diagnoses were wrong only in details not in general involvement.

The following is the comparison of the autopsy, physical diagnosis and x-ray findings on which the previous table is based. All of the physical examinations were made by one of us, and the plates were read by all three, both individually and in concert, as well as by three x-ray experts visiting the hospital as inspectors, and we have taken the best x-ray readings not the worst.

COMPARISON OF AUTOPSY, PHYSICAL DIAGNOSIS AND X-RAY FINDINGS

CASE NO. 197

AUTOPSY	PHYSICAL DIAGNOSIS	X-RAY DIAGNOSIS
Right Lung		
Upper lobe. One inch fibrous tissue then two large cavities and the rest of the upper lobe caseo-fibrosis. Pleura thickened.	Large cavity surrounded by fibrosis.	*Plate taken after death.* Large cavity surrounded by caseo-fibrosis.
Middle lobe. Compensatory emphysema. Pleura thickened.	Compensatory emphysema.	Caseo-fibrosis.
Lower lobe. Large cavity at apex surrounded by caseo-fibrosis. Two cavities just below. Rest compensatory emphysema. About 50 per cent. air bearing. Pleura thickened.	Fibrosis at apex to fifth rib. Few scattered tubercles immediately below. From angle of scapula down compensatory emphysema.	Upper part caseo-fibrosis; rest normal. No ring.
Left Lung		
Upper lobe. Entirely hollowed out by cavity. Pleura thickened.	Entire lobe large cavity.	Entire lobe large cavity.
Lower lobe. Cavity one inch in diameter at apex. Caseation for an inch below. Rest of lobe numerous scattered tubercles of pea size. Pleura thickened.	Cavity at apex with caseation to fifth rib with numerous scattered tubercles below.	Dense shadow over entire lower half of lung diagnosed massive caseation, though the autopsy showed numerous scattered tubercles. The cavity was not indicated.

CASE NO. 395

Right Chest Pneumothorax.	Pneumothorax.	Pneumothorax.
Left Lung		
Upper lobe. Normal to third rib. Few scattered tubercles to fifth rib. Mass of coalesced tubercles to base. Pleura normal.	Caseo-fibrosis to third rib. Scattered tubercles to fifth rib, massive caseation between fifth and seventh ribs.	Normal to fourth rib, caseous broncho-pneumonia to base.
Lower lobe. Marked emphysema. Pleura normal.	Emphysema.	Large cavity in center of lobe. Fibrosis at apex. Another reading: Two cavities in center of lobe. Fibrosis at apex.

Autopsy	Physical Diagnosis	X-ray Diagnosis
Case No. 296		
Right Lung *Upper lobe.* Three large cavities one outside midclavicular line with caseation. No fibrosis. No air bearing tissue. Pleura slightly thickened.	Two large cavities surrounded by fibrosis.	Caseation outside midclavicular line, fibrosis inside surrounding cavities. Another reading: Completely fibrous.
Middle lobe. Number of large scattered tubercles. Pleura normal. Slight emphysema. About 70 per cent. air bearing.	Compensatory emphysema.	More recent and not so dense infiltration. Another reading: Fibrosis and caseation. Another reading: Slight fibrosis.
Lower lobe. Apex two large coalesced tubercles each one-half inch in diameter. A few scattered tubercles with emphysema below. About 85 per cent. air bearing. Pleura normal.	Cavity at apex. Compensatory emphysema below.	Cavity between fifth and seventh rib, also at apex surrounded by fibrosis. Another reading: Normal.
Left Lung *Upper lobe.* Four large cavities surrounded by caseation. No air bearing tis sue. No fibrosis. Pleura slightly thickened.	Four large cavities surrounded by caseation.	Four cavities surrounded by fibrosis. The fibrosis was diagnosed by several experts.
Lower lobe. Upper half large and small cavities. Rest of lobe closely approximated tubercles; 15 per cent. air bearing. Pleura normal.	Compensatory emphysema with scattered tubercles.	Massive fibrosis with cavity towards apex. Another reading: Normal.
Case No. 439		
Right Lung *Upper lobe.* Large cavity at apex extending to second interspace; three smaller cavities 1.5 to 2 cm. in diameter immediately below; rest of lobe caseo-fibrosis (fibrosis predominating). No air bearing tissue. Pleura thickened.	Cavity at apex and between third and fourth rib; rest of lobe caseous.	Cavity at apex; five small cavities immediately below, only three of which could be found at autopsy, and these three were smaller than the x-ray appeared to show them; rest of lobe fibro-caseous, though on different plates the shadow varied, so that it was impossible to be sure whether fibrosis or caseation predominated, yet the shadow was always less than the heart shadow. The density varied from a snow-storm effect to a homogeneous density. A rather dense line at the base of the lobe, thought by some to be thickened interlobar pleura, proved to be dense fibro-caseation within the lobe. There was no special thickening of the pleura between the upper and middle lobes, though it was obliterated.

Autopsy	Physical Diagnosis	X-ray Diagnosis
Middle lobe. Few scattered tubercles; 97 per cent. air bearing. Pleura normal.	Normal.	Normal.
Lower lobe. Several masses of caseation at apex, 1 to 3 cm. in size. At base posteriorly near spinal column recent half gangrenous pneumonic process; rest of lobe contains a very few scattered tubercles; 85 per cent. air bearing. Pleura normal.	Massive caseation at apex with scattered tubercles below.	Normal.
Left Lung *Upper lobe.* Practically entirely hollowed out by two large cavities; the upper extends from the apex to the base posteriorly and to the second interspace anteriorly outside midclavicular line; the second begins about the clavicle inside the midclavicular line and extends almost to base anteriorly. Pleura thickened.	Large cavity at apex with small cavities below.	Cavities with fibro-caseation below.
Lower lobe. Cavity at apex 2 cm. in diameter filled with grumous-sanguinolent fluid. Another cavity 3 cm. in diameter toward middle of lobe, filled with similar fluid. These cavities are surrounded by fibro-caseation. The lower half of the lobe shows numerous scattered tubercles. The hilum shows eight hard anthracotic glands. On the bronchial trunk extending from the hilum to the base are numerous nodules of apparently anthracotic-lymphoid tissue varying in size from 2 to 8 mm. Pleura normal.	Massive caseation at apex, scattered large tubercles below.	Upper part fibro-caseous; lower part normal. The anthracotic glands were not visible.
Case No. 495		
Right Lung *Upper lobe.* Apex for three-quarters of an inch shows considerable air bearing tissue with few scattered tubercles, then a cavity 3 cm. in diameter extending from the clavicle to the second rib in the midclavicular line filled with thick yellowish, greenish, tenacious material. Small cavity at outer margin of lung under clavicle 1.5 cm. in diameter; rest of lobe shows numerous scattered tubercles, varying in size from 2 to 15 mm. About 40 per cent. is air bearing. Pleura normal.	Caseation to second rib, numerous scattered tubercles below.	Fibrosis upper half, caseation lower half. Cavity near junction of clavicle and sternum. (There was no cavity at this point. The cavity found in the middle of the lobe had probably never been evacuated). Another reading: Cavity at apex, fibrosis below, caseation at base. (As is evident this apparent cavity proved to be almost normal air bearing tissue in an unexpected situation.)

Autopsy	Physical Diagnosis	X-ray Diagnosis
Middle lobe. Scattered tubercles. Slight emphysema; 80 per cent. air bearing. Pleura normal.	Few scattered tubercles with emphysema.	Emphysema and scattered tubercles.
Lower lobe. Scattered tubercles. Slight emphysema; 70 per cent. air bearing. Pleura normal.	Not recorded.	Emphysema and scattered tubercles.
Left Lung		
Upper lobe. Outside midclavicular line fibro-caseation and many cavities from 1 to 2 cm. in diameter. Inside midclavicular line caseous-pneumonia anteriorly and air bearing tissue posteriorly. About 10 per cent. air bearing. Pleura obliterated.	Caseation with cavitation to fourth rib, pea to marble sized tubercles below.	Cavity inside midclavicular line between first and second rib; rest of lobe caseation. Another reading: Cavity at apex and at sterno-clavicular junction; rest of lobe caseation.
Lower lobe. Upper half (apex to angle of scapula) fibro-caseation with many cavities 1 to 3 cm. in diameter. Lower half caseous-broncho-pneumonic patches with small amount of air bearing tissue between them; 20 per cent. of lobe air bearing. Pleura obliterated.	Not recorded.	Upper half caseation, lower half scattered tubercles.
	In this case the autopsy showed a tuberculous abscess of the ninth to twelfth vertebrae without clinical symptoms or physical signs which the x-ray diagnosed.	

Our investigations like those of other writers[6] have taught us that conclusions should not be drawn from one plate, nor even from one autopsy comparison, because of the possibility of plate variation. Our current was not very uniform and hence we probably found more than the ordinary variation, but it has proven that the greatest care must be exercised before judgment is passed.

We had only four cases out of over 200 within the four months of the study in which the x-ray showed something undiscovered by physical diagnosis, the last two came to autopsy, the first two were determined clinically only. In the first two cases, Nos. 366 and 262, there is an area apparently of fibrosis under the right scapula in such a situation that it was easily passed over on physical examination unless particularly sought for.

In one it represented almost surely the healed remains of a long passed abscess; in the other it probably represented the same, but there was question whether or not it was entirely cured. These two conditions were by measurement one and one-half inches in diameter, were located between the fifth and eighth rib posteriorly, and centered about two inches from the spine. It is possible that they might have been interlobar instead

of intrapulmonary abscesses. After a study of the literature[7] and seeing some of Webb's, Bullock's, Marshak's and Dunham's plates we are inclined to wonder if a certain number of the abscesses diagnosed in the past as pulmonary may not have been interlobar. Yet in 500 autopsies at the Phipps Institute none was ever found.

The third case in which the x-ray showed something undiscovered by physical signs was one of advanced tuberculosis of both lungs and tuberculosis of the ninth to twelfth vertebrae. The latter gave neither symptoms nor signs, but was very evident on the x-ray.

The fourth case in which the x-ray showed something undiscovered by physical signs is rather important in that it gives us a possible explanation of cracked pot sound. All sorts of explanations have been offered to explain cracked pot over cavities. The x-ray finding in Case No. 296, subsequently proven by autopsy, showed a double cavity, one superimposed on the other in two situations where cracked pot sometimes occurred. The x-ray shows a similar condition in Case No. 17, below a cracked pot sound.

That the x-ray cannot always be relied on appeared in Case No. 17, in which the physical diagnosis shows a lesion from the fourth rib and sixth dorsal spine up with cavitation near apex, while the x-ray shows it to be only above a line extending from the junction of the third rib with the sternum to the outer junction of the clavicle with the first rib. In this case the physical findings are very much greater than the x-ray findings, and are explained by the fact that the x-ray has shown only the condition extending from front to back and not the superficial anterior lesion with normal or even emphysematous lung behind it.

Of the x-ray work so far done, Dunham's[8] is the most satisfactory and apparently the most accurate. It was a pleasure after making a number of comparisons to discover how many of our conclusions agreed. Whether or not his fan-shaped densities and prolonged or thickened linear markings are peculiar to tuberculosis, we are unable to state since all of our autopsies showed advanced lesions on both sides. In addition all of our lesions were active so that we could not follow him into inactivity.

In our readings we have followed the order and general method of Dunham as described in the American Review of Tuberculosis, and found it satisfactory: I plate (whether good, over or under exposed, etc.), II bones, III muscles, diaphragm, heart, IV trachea, V hilum, VI right lung, VII left lung.

CONCLUSIONS

1. Much of the teaching and speculation in regard to x-ray shadows in connection with tuberculosis of the lungs is far from correct as is proven by autopsy.

2. The principal inaccuracy is that fibrous tissue shows more dense than caseation when the opposite is true; in fact, we found not only massive caseation, but even scattered tubercles, when they were numerous, to be denser than fibrosis.

3. In the case of caseation or any other consolidation, like pneumonia,

it is not the caseation or pneumonia *per se* which interrupts the rays and produces the shadow, but the lack of air in comparison with the air-bearing lung.

4. Cavities in the lung are frequently indicated by annular figures, but cavities are also frequently found at autopsy with no rings on the plate; conversely, annular figures are frequently found on the plate with no corresponding cavities at autopsy.

5. The pleura at autopsy was sometimes normal, sometimes thickened, but we were unable to distinguish the difference on the plate.

6. In spite of careful study of six cases while comparing them with the sectioned lungs at autopsy, our subsequent readings of even these cases have never yet been accurate.

7. The failures on the part of the x-ray appear to be due principally to the fact that no two plates are ever taken under exactly similar conditions of milliamperage, time exposure, and distance, producing a difference between plates which may readily be attributed to the pathological. Again the pathological may be so over-exposed as to be lost. In other words each plate is a law unto itself.

8. Advanced tuberculosis with massive fibrosis or caseation, numerous tubercles, or large cavitation can usually be diagnosed by the x-ray, though still more accurately by physical signs. The best results are achieved by careful physical diagnosis compared with the x-ray plate and, if differences are found, submission of these to physical examination before conclusion is reached.

9. Physical signs have frequently brought out lesions and extensions invisible on the x-ray; while the latter have shown only rare ones not found by the former.

10. The x-ray showed a possible explanation for cracked pot sound over cavity, namely, two cavities, superimposed.

11. Though there have been a number of careful autopsy comparisons with plates of advanced tuberculous cases, there is room for more; and there has been entirely too little comparison with early cases. The principal study still remaining, therefore, is a number of carefully taken plates of patients dying of other than lung disease with the expectation of finding at autopsy the occasional occurring early tuberculosis, and the comparative study of these lungs and plates.*

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DISCUSSION ON PAPER BY DR. WALSH, DR. WOOD AND CAPTAIN THOMPSON

Maj. H. Kennon Dunham, Oteen, N. C.: I do not suppose that there is anything this morning that seems to be more important than the study from the pathological standpoint, as Dr. Walsh has given it to you, on x-ray plates and comparison with autopsies. In the Pathological Section to-morrow morning we hope to be able to give you a different comparison and one from which we draw somewhat different conclusions. I want to say to you very frankly, and to repeat what I have tried to say many, many times before, that the reading of the x-ray plate is neither more nor less than the translating of different abnormal densities into cellular pathology. In so far as you are able to translate those facts into cellular pathology, so far you are going to make good with your plates, and where you do not do that you are going to fail.

Now, let us come back to normal markings of the lungs and the bronchus. We have the hilum, we have the bronchus, and the fine markings beyond this bronchus. What tissues produce this density may be a question of dispute. Almost ten years ago I wrote an article on that subject. But the vital point about the argument is that a bronchus is in every one of those trunks. Now, do not forget that the bronchus is in every one of those trunks, whether it makes the density, or whether it does not make the density; whether that is what you see or not, it is present beyond peradventure of a doubt, and since a bronchus is in every one of those trunks, by following those trunks by the x-ray plate, they lead you to the tuberculous lesions and map out the lobes of the lung. Therefore, with good stereoscopic plates you get the lobes of your lungs which is so important. Do not carry it too far, just use it for that, if nothing more. You are also able to see by following the trunks where the bronchi come off the trachea. You are able to see how far down the main stem bronchus the bronchus of the middle lobe is given off. What is most important to us as clinicians, we can see within the lung. Each trunk has its anterior and posterior branch; by them we can locate the abnormal density and predict the location of the physical signs. An abnormal density on the anterior branch of the first interspace trunk suggests physical signs immediately below the clavicle upon that side. If the density obscures the linear markings of the posterior branch of

the first interspace trunk, the physical signs will be found under the spine of the scapula. In a similar manner physical signs can be predicted over various parts of the chest. Over and over again we have tried to find out what pathology underlies a given density; our experiments have led us to the following conclusions. The greatest density is given by calcification, next in order we find caseation, then follows infiltration which divides itself into two classes, fibrosis or scar tissue being quite dense, while infiltration due to tubercle or carcinoma much less in comparison. Finally exudation gives the least density. Cellular exudation is slightly more dense than serous exudate. Blood has about the same density as the exudation of lobar pneumonia.

Such an order of density is easily made out from definite tissues, when each is carefully selected for its purity.

All is not so simple when examining the plate of a living subject, because nature mixes calcification with caseation and infiltration with exudation. But with this key in mind we are often able to read quite accurately cellular pathology within a chest during life. Definite calcification can be diagnosed with accuracy. Caseation is easily made out. We find in the literature, statements that one cc. of caseous material cannot be seen within the center of the lung, even if the lung be removed from the body. Whether or not this be so depends entirely upon how the experiment is carried out. If the lung be removed from the body, allowed to collapse, cut open, allowed further to collapse, and the caseous material placed within this collapsed lung, such as could not pertain during life, there will not be found sufficient variation in densities to define the caseous matter. On the other hand, if the lung be inflated and one cc. of caseous material be pushed well into the center of the lung through a bronchus, there will be sufficient contrast in density to define it easily on the x-ray plate. It is this great normal difference of density within the lung which makes the study of slight infiltration and exudation easy. Thus to differentiate slight pneumonic lesions due to "flu" from similar lesions due to tuberculosis, we must not limit ourselves to an individual density, but study the characters of several densities. In "flu," they will all have about the same character, they all occurred about the same time and have about the same pathology. In contrast to this tuberculosis shows lesions of varying density. The infections took place at various times.

So when we wish to study the lungs after death, we inflate the lung. It is a great step forward when men begin, as did the author, to study their x-ray plates by comparison with autopsy findings. But no progress can be made unless lungs are inflated prior to x-ray examination, whether the exposure be made with the lung within or without the chest.

To-morrow morning, before the Pathological Section, Dr. J. N. Hayes and I will report the comparative findings of 46 x-ray readings of chests which came to autopsy. The conclusions will be very different from those presented by Dr. Walsh.

Maj. Clarence L. Wheaton, Chicago: I am very glad to have the pleasure of listening to this able paper. I believe that the same laws that

govern the transmission of sound govern the transmission of light; the same pathology that is capable of producing certain adventitious sounds within the chest is also capable of changing the vibration of the light wave registering on that plate density shadows in permanent form. Now, in my work in the army, I have had occasion to make practical application—practical use of the x-ray. At Camp Grant, at a certain hour each day, we develop and study the plates that have been taken the preceding day, and it is indeed surprising to find the degree of accuracy with which we are able, after careful study, to interpret these various shadow densities. In men who are sent in for shrapnel wound or bone disease involving the thorax where tuberculosis is not suspected, frequently we will find a tuberculous lesion, and not infrequently an active condition on radiographic examination. We then order these men into the hospital for observation for tuberculosis. Not infrequently we verify these findings clinically. This illustrates how practical the x-ray is to the clinician. I feel that every man doing chest work, every clinician, should endeavor to familiarize himself with radiographic density. I believe the stereoscope should be used as an instrument of precision quite as much as the stethoscope.

Dr. Ernest Zueblin, Cincinnati: I think it is very fortunate to hear such an able presentation of the subject from Dr. Walsh and his associates. I would like to ask Dr. Walsh several questions: first, what tubes were used in their investigation, since difference of opinion exists as to the value of the gas, hydrogen or Coolidge tube; second, what was the time of exposure, the milliamperes used; third, whether the x-ray studies were made by means of flat plates or stereoscopic plates, particularly as the latter method is more satisfactory; fourth, whether the x-ray plates were made with the C. tube placed over the chest or whether, according to our technic, the lungs were removed from the body, inflated and then the x-ray plates made for a comparison of the anatomo-pathological lesions with the changes observed on the plate,—of course, we are still in doubt as to what a density stands for, whether it means exudate, edema or infiltration in the understanding of the pathological process; fifth, what time had elapsed between the taking of the picture and the post-mortem examination, since with a greater interval of time quite extensive changes may be noticed. Without question a comparison of the physical findings with the x-ray plates and post-mortem findings constitutes a very valuable source of instruction, which ought to be more extensively taught to the student and postgraduate pupil as well, especially for the diagnosis of pulmonary diseases.

Dr. Alfred Meyer, New York: Of course, everybody, whether a clinician or technician in radiology is interested, should of necessity be interested in the evidence of the case from both sides. It seems to me that in the practice of medicine we should do both, if we want to do justice to our patients, to forge as long a chain and made up of as many links as possible in order to reach a correct conclusion. Now the relationship of the clinical investigation and x-ray finding is just the same as the relationship of the clinical investigation to other laboratory work. It seems to me it would be just as wrong to reach a final conclusion on the details of any

case of pulmonary tuberculosis on the clinical findings alone as it would on the x-ray findings alone, or without in addition making some bacteriological investigation. Because we all know that tuberculosis of the lung simulates other diseases, actinomycosis for instance. I do not know whether either a physical examination or an x-ray alone would satisfy us with certainty as to whether a case were tuberculosis or actinomycosis of the lung.

Now, with reference to my own clinical experience, I feel that once in a while, perhaps not infrequently, the x-ray will beat the older methods even if the lesion is extensive, but situated in the central portion of the lung. I have made it a point to make my physical examination first, then to have a radiograph taken. I have been astounded sometimes to find that in spite of the greatest care I did not find a lesion, could not find it, even after I had the plate before me. I have made an attempt to apply every single means of the older methods of inspection, percussion and auscultation, and I have not been able to prove by the older method that a large lesion existed near the root of the lung. Frequently I have been glad to admit that the laboratory has beaten me in my older methods. On the other hand, I have found every once in a while a very slight superficial lesion which would give to the ear some fine crepitation at one of the supra-clavicular spaces, and the bacteriology of the case proved that it was a case of pulmonary tuberculosis, and yet the x-ray showed absolutely nothing abnormal.

So that, in the course of years, by comparing these two methods, the older and the newer, I have found that sometimes the x-ray will discover a deep-seated lesion where it is impossible to locate it by the older method. But the older method will beat the modern method when the lesion is very superficial and very small. I think we must bear that in mind and proceed, not in the sense of competition between the two methods but rather of coöperation between the two, just as we do in any type of disease, in forging a chain, as I have said, and thus reach a healthy conclusion.

Dr. James W. Wood, Chester, Pa.: The ideal we all wish to attain both in physical diagnosis and x-ray diagnosis is, as Dr. Dunham suggested, to be able to interpret our physical signs and our x-ray plates in terms of pathology. Now it seems to me, that if this work (the comparative study of pathology at autopsy with the densities on the plate) is to be of any value at all, it should be done with the idea of correlating the actual pathology found at autopsy with the densities on the plate.

The important fact in this study is, that we found the density on the x-ray plate bore a distinct relation not only to the morbid changes which produced that density but also to the amount of air bearing tissue in association with those morbid changes. The point is, therefore, to determine what morbid changes result in greatest air deplacement and thus come to some definite conclusion as to what is the cellular pathology producing the greatest density on the x-ray plates, and be able better to interpret our x-ray plates from the standpoint of being able to say what is the cellular pathology back of this or that type of density on the plate and the physical signs present.

Dr. Lawrason Brown, Saranac Lake: May I ask Dr. Walsh one ques-

tion? Dr. Dunham emphasized how important it is to x-ray the lungs when they are expanded. He spoke of taking x-rays of the lungs in the chest, of taking the lungs after death. We know that after death you cannot get the real shape of the lungs, because there is a condition of hypercontraction or hyperexpiration. I would like to ask him when he takes the lungs out of the chest if he expands them before x-raying. If he did not, I should think he would get a great many confusing things.

Dr. Walsh: On account of the fact that we were making a special study of the comparison of x-ray plates with autopsies, we neglected nothing which we thought might aid us. We were not satisfied with one plate, but took them at intervals up to the time of death. In addition immediately after death we took another; on removal of the lung from the thoracic cage another; and finally, separating the heart from the lungs, we took the lungs alone. In some instances we even took other plates after the lungs had been incised, but these never proved satisfactory, since the lungs then entirely collapsed.

Dr. Brown's point is well taken that after complete collapse of the lung pathology does not stand out, yet we found the plates taken immediately after death before the thorax was opened quite as satisfactory as the plates taken during life, though we did not inflate.

The comparison of the autopsy was always made with the most perfect of our series of plates regardless of the fact whether this was taken before or after death, in other words, we were endeavoring not to find fault with the x-ray, but to learn exactly what its shadows meant so as to read it correctly.

Moreover, in the comparison of the diagnosis from the x-ray plate and the physical findings, we have taken the plate reading which was most nearly like the autopsy findings, in other words, in spite of the fact that the plates were read by the three of us individually and put in writing, then by the three of us in concert, and finally by two or three x-ray inspectors visiting General Hospital No. 17, the reading we have reported is the most perfect of these five or six.

We used Coolidge tubes, and took special pains to make the time of exposure and distance uniform. I regret to say our current was not the most dependable and we oftentimes had difficulty with it, more so I believe than in the majority of places, yet our difficulties lead us to doubt the possibility of ever being absolutely certain about the exact uniformity of plates taken at different times. There are so many possibilities of unexpected line drop and other differences that we are inclined to believe every plate even under the best of circumstances is a law unto itself.

All of our work was done with the stereoscope, which we always found much more satisfactory than the flat plate.

On account of being a clinician, I was personally very much interested in the finding of a possible cause for the production of cracked pot sound over occasional cavities. Following Laennec's description of it, Walshe about 1860 demonstrated practically all the conditions under which it is found, namely, certain pulmonary cavities, above a pleural effusion, over

occasional pneumonias when the consolidation is at its height, over rare cases of bronchitis, and over the chest of crying children.

On account of the fact that it can, also, be produced by filiping the cheek with the mouth open, but not closed, Walshe thought that it occurred over a cavity only when the cavity communicated so freely with a bronchus that the contained air could be instantly expelled.

In one case showing cracked pot in the first and third left interspaces with dulness between the x-ray showed a double cavity (two cavities superimposed) in both situations, and the autopsy showed practically the same condition, for although there were only three cavities, the second was practically superimposed on the first and the third superimposed on the lower part of the second. From experimentation on various sorts of cavities (like two tracheas for instance) one superimposed on the other outside the body, the sound is more typical than when one cavity alone is percussed.

This appears to account better for the frequency with which cracked pot is present and absent from time to time in cases showing it; if one cavity is full, it fails to be produced, though tympany is still present. It also accounts for the cracked pot above a pleural effusion and in crying children. Recent experiments have shown that in forced expiration the diaphragm can be raised to the level of the third and even the second rib. Crying is mostly expiratory, and like forced expiration or a pleural effusion, can push the lung upwards, thus compressing it into a small space. This compression not only consolidates the lung, but brings the bronchial tubes sufficiently close together to act as a series of small cavities, especially in children in whom the tubes are large in comparison.

A PRELIMINARY STUDY OF CLINICAL ACTIVITY

By

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THE object of this paper is to define, if possible, clinical activity in such a manner that it may be of use to those engaged in ordering the life and affairs of the tuberculous patient. It is no longer sufficient to diagnose the mere presence of clinical tuberculosis, for the experience in the draft during the last year or two has revealed many men who undoubtedly have pulmonary tuberculosis, but for a number of years have suffered in no way from its presence in their lungs. It is readily conceivable that many other disorders of more or less importance may occur in such patients and arouse suspicion that the old and previously slumbering pulmonary tuberculosis may be awakened into activity. As a matter of fact this problem is constantly recurring in every sanatorium and must be faced almost daily. If it can be solved by the busy general practitioner who sends patients to the sanatorium, it will save anxiety, worry and financial loss, not only to the patient but to the institutions as well. For these reasons we have attempted to give expression to views that have been for some years slowly maturing, but still leave us, we fear, too far afield to be of much value.

PATHOLOGICAL ACTIVITY

We hold that "activity," or focal activity, or, as we prefer to call it, pathological activity, denotes that stage of a tuberculous process in which some change is taking place, whether progressive or retrogressive.

Pathological activity can always be safely assumed when clinical activity is present, but progressive pathological activity may occur for a longer or shorter time without evidence of clinical activity, and, again, retrogressive pathological activity can continue long after all evidence of clinical activity has vanished.

Evidence of former pathological activity is clearly manifest in many individuals on examination, by x-ray or at autopsy, from whom no history of clinical activity has been or can be obtained. Pathological activity must, of course, always precede clinical activity, but how long it may precede in cases which later become clinically active is difficult to determine. Pathological activity and physical signs can be correlated no more than clinical activity and physical signs. Many cases present symptoms of clinical activity a week or ten days before any increase of physical

signs can be detected. Indeed, unless the disease is "apical," the indeterminate or indefinite physical signs may be misleading.

However all this may be, we have made an attempt to correlate roughly pathological activity with laboratory findings and x-ray changes.

Now, in our opinion, clinical activity always implies pathological activity, but absence of clinical activity does not exclude pathological activity. For this reason we shall postpone the discussion of symptoms and physical signs until we discuss clinical activity.

LABORATORY FINDINGS

We have divided our laboratory studies under four heads: sputum, feces, urine and blood.

A. Sputum

The occurrence of tubercle bacilli in the sputum indicates pathological activity in about 90 per cent. of all cases, but absence of tubercle bacilli does not exclude activity, as is well known. In 70 per cent. even of certain cases without sputum, pathological activity may be present. We feel that when tubercle bacilli occur after the administration of *KI* or the occurrence of a mild acute disease of the upper respiratory tract or of influenza, that pathological activity may be indicated. The adsorption of anti-ferment in the blood by certain organisms circulating in the blood, which we feel can occur in rather mild acute diseases, or by saturation with *KI*, may enable the proteolytic ferment to soften the focus and so to set free tubercle bacilli. This explanation we hold is still hypothetical.

The number of tubercle bacilli present in a specimen with the rough methods of examination usually employed does not give any definite information regarding pathological activity that their mere presence does not afford.

In regard to their morphology and arrangement, short bacilli, even in clumps, give no further evidence of pathological activity than the mere presence of tubercle bacilli. This also holds true, we believe, for the splitter form of tubercle bacilli. Much's granules and the presence of tubercle bacilli within certain cells in the sputum, are of no especial importance for the determination of pathological activity. Elastic fibres in the sputum, of course, always indicate pathological activity.

B. The Stools

Tubercle bacilli in the stools of adults at least have the same significance in regard to pathological activity as when they occur in the sputum.

C. The Urine

The diazo and urochromogen tests as well as Russo's methylene blue test occur in some cases, more especially the far advanced, but fail to occur in cases with unquestionable pathological and clinical activity.

D. The Blood

The numbers of red and white cells are of no value. In regard to Arneth's neutrophylic picture, we do not like to be too positive, but we

doubt the value of a single count in the determination of pathological activity.

As slight changes of hydrogen ion concentration may influence agglutination of tubercle bacilli, we do not feel that this phenomenon has proved of any value in determining the presence of activity.

There is no evidence to show that any relation exists between precipitins and pathological activity.

The technique necessary for the study of the opsonic index is too unreliable and too intricate for us to consider.

At the onset of pleural effusion, pathological activity can practically always be stated to be present.

COMPLEMENT FIXATION

Many attempts to determine clinical activity by means of the complement fixation test have been made in the past few years, but the variations in results are striking, from 55 per cent. to nearly 100 per cent., due possibly to carelessness in observance of details, and to over-enthusiasm. Variations occur even when workers use the same antigen. We feel that the complement fixation test in tuberculosis is specific, for up to this time no single protein, lipoid, lipoprotein or phosphatid has been found which can be used successfully as an antigen in tuberculosis. This leads us to conclude that the reaction is a true antigen-antibody complex, for any workable antigen must consist of the tubercle bacillus or its products. We recognize that the reaction is a colloidal complex (like agglutination and precipitation) depending upon the external and internal phases (disperse phase, dispersion medium) and that the tubercle bacilli, as such, may or may not have anything to do with the reaction.

If we assume that Ehrlich is correct in his interpretation of his side chain theory of the production of antibodies, then we must also accept that a positive complement fixation test means that antigen either is or has been in the circulation, or, in other words, a positive complement fixation test indicates pathological activity, but of course not necessarily in the lung or organ under study. In fact, in 15 per cent. of the positive complement fixation reactions we can explain the fact only by some extra-pulmonary focus of disease. Two of us (Brown and Petroff) found complement fixation positive in 81 per cent. of patients with active tuberculosis, and in 61 per cent. of the inactive cases as defined in that communication. Further study suggests that the complement fixation test is connected with pathological activity when there is absorption of antigen. In a certain group of cases (the group with tubercle bacilli present, with parenchymatous x-ray lesion, and symptoms of clinical activity) the test was positive in 95 per cent. In a certain number of patients, even some with tubercle bacilli present at the time of the test, the complement fixation may be negative. Here, antibodies may have been absent from the blood for some time, or the question of the multiplicity of antibodies, or the presence of anti-antibodies, may be recalled. With the advancement of colloidal chemistry we may yet be able so to perfect the test that such failures of reaction may be satisfactorily explained.

THE X-RAY

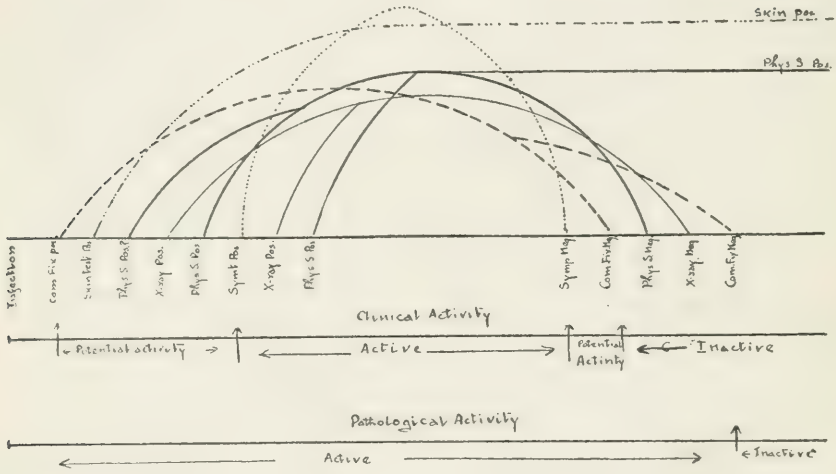
Almost since the first roentgenograms were taken of the thorax for the diagnosis of pulmonary tuberculosis, and particularly so since modern technique has produced what might be termed instantaneous exposures of the chest, the question has been asked and discussed as to whether the roentgenogram (for the fluoroscopic screen is out of the question) can differentiate between active and inactive or healed pulmonary tuberculosis. It is quite likely, at least in theory, that the pulmonary changes created by the advance or retrogression and, if we may say, final healing of pulmonary tuberculosis do produce certain shadows in the roentgenogram which may or may not be differentiated, depending upon many influencing factors. Pathologically active tuberculosis differs materially from the healed tubercle or resulting scar tissue. Theoretically, if we are to regard the roentgenogram as revealing living pathology, or as a living "autopsy," we should see in the stereoscopic plates of the chest, shadows differing in certain characteristics. We have attempted a study of these shadow changes in the hope that some information might be obtained as to the value of the stereograms in differentiating active from inactive pulmonary tuberculosis. It is quite difficult, in fact almost impossible, to describe accurately the various shadows and the variations in them that occur from time to time, with special reference to their value in differentiating activity from non-activity. In the indisputably active cases we see an entirely different picture from that seen in the case which can reasonably be considered healed. In the former we usually see a combination of various shadow manifestations, and in order to avoid confusion an attempt will be made to describe a small field in the active process. (The reason for selecting a limited field is that we have less confusing shadows to complicate the interpretation.) Assuming that there is no scar tissue or calcification in this limited area, we see mottling with decidedly ill-defined margins, or a "cotton-ball" appearance, as we prefer to call it, blending gradually with the surrounding lung tissue, which appears hazy or clouded. As a rule, this term "cotton-ball" is very descriptive of these active areas, though at times the term would not convey the proper picture. A roentgenogram of a ball of any substance produces a center denser than its margin, with various steps in between. However, we often see shadows more homogeneous in character to which the term "sheet cotton batting" might be applied. It is quite obvious that there are various shadows to which numerous other terms might be applied, nevertheless, it is only the roentgenogram that can really portray these shadows. Assuming then, that this "cottony" or "cotton batting" appearance indicates activity, as the disease retrogresses the lung tissue surrounding the cotton ball appears to become better aerated, and probably at the same time we realize that the cotton ball is smaller and more compact. Or, again, we may see the cotton balls (usually small ones) almost fade from view, leaving a more or less finely dotted appearance, or little stringlike shadows. However, many of these latter manifestations may have been present at the time that the cottony appearance existed

and become only more apparent as the cottony effect subsided. As time goes on, when the patient is doing well, another set of stereograms commonly reveals what might be called a repetition of the above change, i. e., the mottling loses still more of its collateral haziness, the "cotton balls" become more compact, or the appearance is more discrete, the ray filtering through areas that previously were hazy, and the picture is that of a better aerated lung. As a rule these changes take place slowly. In those cases which go to "ultimate healing" we see vastly different shadows in the final plates as compared with the first. Often we are not able to plate cases when we would like to, and many of these intermediate steps or changes are not recorded. Then again, there are only a few cases which we have been able to follow five or more years. The great majority fall in that group which remains under observation for less than two years. Let us assume, then, that the case cited above does go on to "ultimate healing." As we are very seldom able to follow a case roentgenographically to ultimate healing, it will be necessary to describe what is usually found in the plates of patients who, from all available evidence, could be pronounced completely healed. The plates taken as a whole, show a preponderance of stringlike or wiry shadows or dense, discrete mottling, either conglomerate or isolated. This does not necessarily indicate that we do not see a somewhat "cottony" appearance here and there in the lung field, but, as a rule, it presents a different character when it is compared with a former pair of plates of the same patient, or with a case that is undoubtedly active. At times a localized or general haziness is seen in these healed cases. It is then necessary to exclude as far as possible, such shadows as muscle, mamma, or thickened pleura.

So much for the retrogressive cases. In what way do the progressive changes differ? As a rule we see the picture somewhat reversed. We do not, however, see the "cotton ball" grow, as we saw it diminish. Rather do we see new areas of mottling (tuberculization) appear, many times accompanied by a localized intrapulmonary cloudiness. This mottling is always of a fluffy or "cotton ball" character, though much depends upon how long after the development of the tubercles (mottling) the plates are taken. As a rule the predominant change in the progressive cases is an increase of mottling, though at times the only change to be discerned is an increase of localized or collateral haziness surrounding previously present mottling or linear markings. This might be made clearer if we were to say that we inferred from such a picture the presence of an area or areas of hyperemia surrounding a tuberculous focus. As the process progresses we observe an accumulation of the above shadows, the lung field becoming denser but not necessarily consolidating. These changes go on and various combinations of densities exist in the terminal stages. However, as we are very seldom able to plate most of the cases up to death, terminal roentgenographic changes are not recorded.

In regard to the plate that reveals no changes from week to week or month to month, it is quite probable that this plate must reveal what might be called ultimate scar tissue (fibrosis or calcification) with the absence of any "inflammatory" changes. Here we invariably see shad-

ows of a stringy or dense nodular character, lacking the usual collateral haziness seen in the "active" plates. However, this picture is not always so simple. There are shadows of a somewhat hazy (not fluffy or cottony) character that do not change from month to month, and resemble the "active" type, and it is impossible in some instances to differentiate them. However, as a rule, these hazy or cloudy fields have a more clearly defined margin. To say that these fields will never show a clearing is not our idea, but the changes may be so gradual that plates taken months and, in some instances, years apart, reveal no differences in the shadows. It is obvious that the patient may do badly and show an increase; however, we are only judging the plates from the standpoint of clearing.



CLINICAL ACTIVITY

Clinical activity we have defined as that state in pulmonary tuberculosis in which pathological activity is not latent, but is producing through the actual and immediate absorption of poisons certain clinical or laboratory manifestations of disease, which disease may in turn be progressing, stationary or even for the time being retrogressing.

To facilitate our study we have arbitrarily divided the usual symptoms of patients into two groups, cardinal and subsidiary, as viewed from the standpoint of activity. The first group of cardinal symptoms embraces fever, rapid pulse, pleurisy, hemoptysis, lack of endurance, loss of weight and nightsweats; the subsidiary group, chills, cough and expectoration.

We have attempted to study the problems by classifying the patients on admission and noting the occurrence of relapse, and the amount of exercise taken during residence. We realize that many objections can be raised to such methods, but nevertheless we present our data as a preliminary to a deeper study of a most intricate problem.

In comparing the patients that relapsed with those that had an uninterrupted course, nine-tenths of the relapsed had a positive complement fixation test and seven-tenths were clinically active, while, of those who did well, one-half had a positive complement fixation test and one-quarter were clinically negative.

The recent importance attributed to rales as a guide to clinical activity led us to include them in this study.

If tubercle bacilli are present in the sputum, clinical activity is three times as likely to occur if rales are present, but even then only one-half of these cases are clinically active. If tubercle bacilli are not present, then clinical activity occurs in only one-fifth of the cases, irrespective of whether rales are present or absent. In cases without rales, as many patients are clinically active when tubercle bacilli are absent as when present. In 11 (44 per cent.) of the 25 cases without tubercle bacilli, only a peribronchial or a questionable parenchymatous lesion was found. Of these eleven cases, six had hemoptysis, one had tuberculosis of the eye and four had pleurisy.

The importance of cough and expectoration in regard to clinical activity has been gone into. As far as can be determined from these figures, clinical activity does not vary whether sputum is present or absent. Whether rales occur or are absent in cases with or without sputum is also of no importance.

In conclusion, we would like to say that we have been led to present these data to you in the hope that they may stimulate some of you to take up the study of this important and intricate subject.

	Number	*Per cent. Com. Fix.*	*Per cent. Clin. Act.*
Relapsed Cases	62	90	70
Uninterrupted Course	134	54	28
RALES			
Rales Present:			
Tubercle Bacilli X	146	79	53
Tubercle Bacilli O	57	47	21
Rales Absent:			
Tubercle Bacilli X	21	52	19
Tubercle Bacilli O	25	28	28 ?
SPUTUM			
Sputum Present:			
Rales Present	145	76	50
Rales Absent	26	42	21
Sputum Absent:			
Rales Present	57	27	39
Rales Absent	20	30	25

NOTE: Tubercle bacilli previously only: Hemop. 6
Pleur. 4
Eye 1

DISCUSSION ON PAPER BY DR. BROWN, DR. HEISE, MR. PETROFF AND MR. SAMPSON

Col. George E. Bushnell: I should like to have had an opportunity to study this important paper before attempting to discuss it. I did not hear everything that Dr. Brown said and am, therefore, compelled to confine myself to some general remarks on the subject of the paper.

The question, what are the signs of clinical activity, is, of course, a very important one. I will say a few words in defense of what might be called old-fashioned methods of physical diagnosis. I believe that it is easier to tell whether a lesion is active or inactive, whether rales mean rather acute inflammation or a chronic condition of little present importance, than is often believed, and that the reason why such distinctions seem difficult is because the physical signs are not carefully enough studied. In studying rales one should note, not only whether they are moist or so-called dry rales, but also the apparent viscosity of the fluid in which they are produced, their size, their quality (consonating or noconsonating), the phase of respiration in which they occur, whether they occur in both inspiration and expiration, their depth, that is whether breaking near the ear or more distant, their persistence, and their distribution. Similarly with changes in the breath sounds. I have sometimes been surprised at failure to recognize impairment of the normal sounds when plainly present. No one can say that he has exhausted the possibilities of the old-fashioned diagnosis until he knows that he can perceive, remember, and correctly interpret minute changes in breath sounds, and all the variations in the sounds that we call rales.

Dr. F. M. Pottenger, Monrovia, Cal.: One of the most difficult as well as most important questions for those who are interested in the treatment of tuberculosis to decide is that of the presence or absence of clinical activity. A few years ago I suggested a classification of the symptoms of tuberculosis which has helped me greatly in deciding this question. The classification is based on the conception of tuberculosis being a chronic infectious disease which, when involving the lung, causes an inflammation which results in local disturbances and in irritation of the nerves which supply the lung producing reflexes in other tissues and organs. This gives opportunity for three groups of symptoms. When toxemia is present, we have the toxic group. As long as inflammation is present we are apt to have reflexes, giving us the reflex group. The very presence of the disease itself produces a third distinct class of symptoms which I have designated the group due to the disease *per se*. The importance of this grouping can be readily seen. The first two groups depend upon the nervous system. The physiological balance of the body is maintained largely through the nervous system, toxins act upon the nervous system and upset this balance; consequently when toxemia is present if it be of sufficient grade it produces a certain group of symptoms. When inflammation is present in any organ whether accompanied by toxemia or not it stimulates the nerve endings in that organ and produces reflex symptoms in the structures which are in reflex relationship with its nerves. It

can be readily seen that the reflex group of symptoms may be present without the toxic symptoms, but we could hardly expect the symptoms due to toxemia to be present without some of the reflex group. The symptoms classified according to these groups are as follows:

Group I	*Group II*	*Group III*
Symptoms Due to Toxemia	Symptoms Due to Reflex Cause	Symptoms Due to the Tuberculous Process *Per Se*
Malaise.	Hoarseness.	Frequent and protracted colds (tuberculous bronchitis).
Feeling of being run down.	Tickling in larynx.	Spitting of blood.
Lack of endurance.	Cough.	Pleurisy.
Loss of strength.	Digestive disturbances (increased muscle tone and increased secretion).	Sputum.
Nerve instability.	Loss of weight.	
Digestive disturbances (decreased muscle tone and decreased secretion).	Circulatory disturbances.	
Loss of weight.	Chest and shoulder pains.	
Increased pulse rate.	Flushing of face.	
Night sweats.		
Temperature.		
Blood changes.		

It will be noticed that the toxic group represents a general disturbance in the central nerve cells and further that the toxins express themselves in peripheral structures largely through the sympathetic system. Thus there is a rapid heart action, a disturbance in vessel tone which produces vasoconstriction in the skin, and an inhibition of secretion and motility throughout the gastrointestinal tract as an important part of this action. Reflexes are sometimes produced through the sympathetic nerves which mediate with the sensory cervical nerves and produce pain in the shoulders; spasm in the muscles; and atrophy of the soft parts, if the disease becomes chronic. The reflexes which are produced through the vagus which belong to the parasympathetic system reflect mainly in other organs producing so-called functional disturbances. The third group of symptoms is due to the disease process *per se*. These four very common symptoms,—frequent colds (tuberculous bronchitis), hemorrhage, pleurisy and sputum,—are all produced by disturbances in the tissues at the point of inflammation.

In analyzing these symptoms with reference to active tuberculosis I would like to call attention to the fact that the group due to toxemia is not pathognomonic of a tuberculous toxemia. This same group of symptoms may be produced, though varying in severity, whenever toxemia of any kind is present in the body. We also find certain of these symptoms, particularly that of malaise and lack of endurance due to such conditions as neurasthenia, over-work and psychical states. In the past we have wrongly delegated too much authority to this group of symptoms in determining when active tuberculosis is present. I would like to emphasize that none of this group of symptoms gives us such positive information. They tell us that the equilibrium in the central nervous system is disturbed and that there is a marked peripheral action in those tissues which are supplied by the sympathetic nerves. The symptoms in this group do not tell us that tuberculosis is present, neither does their absence

tell us that activity is not present. In fact, such symptoms as temperature, malaise, lack of endurance, rapid heart action and hypo function on the part of the stomach and intestines only show that something is acting upon the sympathetic nervous system.

Tuberculosis is a disease, chronic in nature, which runs an uneven course as far as toxemia is concerned. One week we may have a rise of temperature, symptoms of malaise, lack of endurance, disturbance on the part of the gastrointestinal tract and rapid heart action, next week these symptoms of active toxemia may be gone; yet no one would say that the disease was active during the former week and that it was not active during the latter week. The tendency to make the terms toxemia and activity co-extensive has greatly confused the question. When symptoms of active toxemia are present, if they are due to an active pulmonary tuberculosis there will nearly always be present some of the reflex group of symptoms due to the tuberculous process *per se;* and it is upon this combination that we may rely for diagnosis.

The reflex symptoms are also very important in determining the presence of activity, not so much in themselves but in their combination with symptoms of group I and group III. The reflex symptoms unfortunately express themselves in other organs instead of the lungs, and of themselves are apt to be misleading. Important reflex symptoms through the vagus are shown in the larnyx and in the gastrointestinal tract and sometimes in the heart. The path of the reflexes is through the sensory branches of the pulmonary vagus to the medulla: and in case of the larynx out through the superior and inferior laryngeal nerves, causing hoarseness, irritation in the larynx and cough; and in case of the gastrointestinal tract out through the gastrointestinal branches of the vagus producing increased tonus in the muscles of the gastrointestinal tract and a tendency to increased activity of the glands; and in case of the heart out through the cardiac branches of the vagus producing a tendency to slow the contraction. This latter does not always manifest itself. In some cases of rapid pulse on exercise I have seen a relative bradycardia when the patient was put to rest. It is commonly said that the heart in tuberculosis is rapid, this may or may not be true. If the patient is calling for extra work upon the heart it is apt to be rapid, on the other hand many patients if put to rest will show a comparatively slow pulse. I have seen this reflex inhibitive action on the part of the vagus so strong that, in some cases where cavity was forming and the patient was suffering from marked toxemia, there was a relative bradycardia present; in the same instances I have seen hyperchlorhydria, and increased muscle tonus in spite of the fact that the sympathetics were markedly stimulated by the toxemia.

Another reflex symptom of some importance is pain in the shoulders and neck. The sympathetic nerves from the inflamed lung carry the impulse back to the upper five or six thoracic segments of the cord, transfer them upward in the cord to the cervical segments where they are transmitted to the sensory cervical and spinal nerves. The third and fourth segments of the cord are particularly influenced by reflexes from the lung

although all cervical segments may at times show some reflex action. The skin and subcutaneous tissue of the neck and shoulders above the second rib anteriorly and spine of the scapula posteriorly are supplied by the third, fourth and fifth cervical nerves, consequently these areas are the ones which show most pain when the lung is involved. The interscapular area is sometimes the seat of pain through the third to fifth thoracic nerves when the hilus is involved. The motor nerves which take their origin from the cervical segments are also subject to reflex action from the lung. This motor reflex shows particularly in the diaphragm and the accessory muscles of respiration, producing increased tonus or spasm.

It can be readily seen that the reflexes mentioned above, aside from the motor reflexes in the muscles of respiration, may be due either to disease in the organ involved, thus the larynx, heart and gastrointestinal tract, or due to a reflex from some other organ. They of themselves do not point to disease within the lung. It is only when we find them combined with other symptoms of group I and group III that we are justified in considering them as due to an active pulmonary lesion. The pain in the shoulders, therefore, has a particularly localizing value, so do the motor reflexes in the muscles. If a patient should have hoarseness and cough and have a spasm of the muscles of the neck and shoulder girdle or of the diaphragm as would be inferred from lessened motion, an active inflammation of the corresponding lung should be thought of. Neither pain in the neck and shoulders, hoarseness, irritation in the larnyx and cough, gastrointestinal disturbances denoting hyperactivity, or a tendency to bradycardia when the patient is at rest alone or in combination point to an active process in the lung; but if they are found in the presence of frequent colds, pleurisy, hemorrhage and expectoration, or combined with the symptoms due to toxemia they should be looked upon as being suspicious.

The symptoms of group III: tuberculous bronchitis, hemorrhage, pleurisy and sputum are fairly definite in determining the presence of tuberculosis. Tuberculous bronchitis is practically always associated with some symptoms of group I and II. The same is true of pleurisy. Hemorrhage while usually associated with symptoms of group I and II may be present alone. I have seen this in a few instances. When sputum is present some reflex symptoms from the lung, particularly those in the larynx, are nearly always to be found. The symptoms belonging to the toxic group may be either present or absent. If the sputum contains tubercle bacilli, a relatively large number of lymphocytes, or a high albumin content it is presumptive evidence of tuberculous activity. Bacilli are almost always evidence of activity in early cases, but in old cases where small ulceration has taken place bacilli sometimes persist although the case no longer gives evidence of activity.

In regard to pleurisy I wish to emphasize the fact that dry pleurisy is of as much importance in its relation to pulmonary tuberculosis as pleurisy with effusion. This does not seem to be generally recognized, although it is undeniably true. I desire further to call attention to the

fact that pleurisy is more common at the apex than at the base, although at the base it gives us more marked symptoms.

In the classification offered I have endeavored to show how we may group the symptoms in tuberculosis in such a manner as to give evidence upon the question of activity. I now desire to show how these symptoms connect up with the increased muscle tension which results from inflammation in the lung. Every important organ stands in reflex relationship, through the sympathetic nerves which supply it and certain groups of spinal nerves, with certain muscles upon the surface of the body in such a manner that when the organ is inflamed these muscles have their tone increased, producing increased tension or spasm. The lung as previously mentioned is supplied by sympathetic nerves from the upper five or six thoracic segments of the cord. The afferent nerves from the lung, however, do not mediate with the nerves from these same segments but pass upward in the cord and mediate with the segments in the cervical portion producing reflex motor and sensory disturbances while the process is acute and reflex trophic change after the disease has existed for some time. The trophic changes are found in all tissues supplied by both motor and sensory nerves. The muscles which show the increased tone are the diaphragm, sternocleidomastoideus, scaleni pectoralis trapezius, levator anguli scapulae and rhomboidei. This increased tone or spasm, except in the diaphragm, may be determined by palpation. In the diaphragm it may be inferred from the limited motion, providing pleural involvement is not present. When marked tension is present it is strong evidence that the inflammation in the underlying lung is markedly active. The limited motion produced by the diaphragm has long been recognized as of value in diagnosis. It is not all due to altered tension of the diaphragm, however, part of it is due to change in the lung tissue itself, and part to involvement in the pleura. Sometimes symptoms may be found which throw considerable doubt upon the diagnosis of active tuberculosis. Under such conditions if the muscles of the shoulder girdle show increased tension and the diaphragm on the side shows limited motion (excluding pleural cause) one can be fairly sure that there is active inflammation in that lung.

An understanding of the symptoms of tuberculosis in their etiological relationship as shown in this grouping, and an appreciation of the fact that active inflammation in the lung produces reflex motor change in the diaphragm and muscles of the shoulder girdle gives the examiner a viewpoint from which he can judge with a high degree of certainty as to the presence or absence of clinical activity in a given case of tuberculosis. The ordinary methods of examination, however, should always be utilized. Inspection and palpation are of great value in determining the motion of the chest and the condition of the muscles, skin and subcutaneous tissue. Percussion gives no information as regards activity. Ausculation gives information the value of which is greatly enhanced when the data obtained by it is correlated with the etiological grouping of symptoms and the presence or absence of reflex increased tone (spasm) of the muscles. These methods should not be considered as impractical, because they are

within the understanding and practical application of all examiners. They will give more aid in determining the presence or absence of activity in a questioned case of tuberculosis than our older methods or our laboratory tests.

Dr. Charles L. Minor, Asheville: Trudeau and many others have dwelt upon the excessive difficulty of making a prognosis in pulmonary tuberculosis, and if Dr. Brown, by laboratory or any other methods can give us assistance in this matter, we shall owe him a great debt of gratitude. The subject is too wide to be taken up in a few words, and in the few moments that I have, I will confine myself to one point only, and that is the point that Colonel Bushnell touched upon. We all recognize that it is not an easy matter always to determine positively whether a rale is a moist or a dry rale, a distinction which the Germans do not make, but which, the longer I study tuberculosis, the more I feel satisfied is justified and necessary. Certain authors call only sibilant and sonorous rales dry, claiming that since the others are caused by secretion in the tubes, they cannot be called dry; but it must be remembered that with the exception of asthma, sibilant and sonorous rales are equally caused by secretions, and equally therefore in their etiology, moist, yet no one doubts that they are dry in tone.

In the same way, the dry crackle of Walsh, the crepitant rale, and the medium and large crackle, are purely dry sounds, although unquestionably they are due to the presence of a very viscous, scanty secretion in the tubes. On the other hand, the fine or medium moist rales, which are so unfortunately called sub-crepitant, a misleading and unfortunate term, which I have long thought should be given up entirely, are distinctly moist to the ear. I need not dwell upon the large moist rale, and on the gurgle or bubble, which are of course still more distinctly moist.

In this connection, I regret that my friend, Colonel Bushnell, has lately brought in the unfortunate term "indeterminate rales." Indeterminate, means nothing, and describes nothing, and, therefore, leads to lack of clarity in the conceptions of those who use it to describe what they hear, and I think it would be a pity should it be adopted.

The pathological picture, presented to our minds, by the fine crackle or the crepitant rale, or by the medium crackle, is a very different thing from that presented by fine, medium or large moist rales, and prognostically the latter of course is infinitely more serious in a large majority of cases. Fortunately everybody understands the significance of the crepitant rale. The others are not always clearly visualized. In listening to a chest, there are few things that assist us more in our prognosis than the dryness or the moisture of the rales we hear in the case. I cannot give statistics on this matter, such as would please my friend, Dr. Brown, but I think the experience of any man experienced in these diseases will bear me out.

Finally let me say that while in prognosis we count in many things, the appearance of the patient, his history, his mental attitude, his various symptoms and his physical signs, all of which assist us, I think that if we were to pick out one thing which decides us more than another, it would

probably be the moisture or dryness of the rales, with the light they cast on the nature of the pathological process going on in the lungs.

Dr. Ethan A. Gray, Chicago: One word, particularly, I should like to say—it cannot be too often repeated, it is, as Dr. Minor said a moment ago, "study the patient." Often enough there is too little study given the patient, when a little study is all that one needs to find the key to the problem. I hope that Dr. Brown will boil down his wonderful presentment, sometime, into a compend which we other workers in the field can use as a daily manual. Let us study our cases so that we may understand that a focus of infection does not always mean physical disability. If we recognize this, we shall have arrived somewhere. Those of us who specialize in tuberculosis know this, yet it is all too common to have cases sent to the sanatorium with the statement that the bacillus has been found, or that the Pirquet, if you please, is positive and the patient, therefore, is an invalid. We do not deny that the patient is tuberculous, but that he is necessarily disabled, we do deny. Sometimes it is difficult to make the referring physician understand that his patient may have tuberculosis somewhere in his body and still be able to earn his livelihood. This problem always touches the factor of rest; the tuberculous individual cannot burn the candle at both ends—late to bed and early to rise, for instance. He must learn how much he can do and be guided accordingly.

The Arneth count, which has been mentioned, has elements of truth and, apparently, elements of error. I have found it an invaluable indicator in progress and prognosis in the tuberculous. The reading of the blood picture is largely a personal or individual thing. To estimate the Arneth count we must always establish a standard; we should recognize that there is a point of thickness, on one side of which one may record one nucleus, on the other, two nuclei. Such a standard once established, makes the Arneth of definite value.

Maj. H. Kennon Dunham, Oteen, N. C.: I would like to speak just a moment on the line of prognosis and say that there are just two wonderful stages of prognosis. One is the place where Dr. Brown has taken it up and tried to show us what might be done, giving a suggestion of what we hope to do. But the worst detriment, the greatest drawback in making a prognosis,—as it has been in the past and will be in the future until you and I stop it,—is the point that none of us are willing to put our conclusions to the test, and put down in black and white how long that fellow is going to live. If you will just put it down, face the truth of what you think is going to happen to that fellow and this fellow, and thus face your mistakes, you will be sure to use eventually these various laboratory methods of the x-ray and the complement fixation test and so forth, which will add to your knowledge and benefit your patient.

Colonel Hoagland, the Commanding Officer of the United States General Hospital No. 19, early in the establishment of that institution called in the Chief of the Medical Service and myself, acting as Chief of the Laboratory Service, looked us straight in the face and said, "What are you men going to do to furnish me with data that will express on paper what you think about that man? Now, I do not care whether you are

right or wrong, but your opinions, or those of your men, are the utmost I can get. I cannot go over there and examine those men myself. I want to know how long you think that man ought to be in the hospital, what is the matter with him, whether he is ever going to get well or not. Now, make your mistakes, but, for the love of heaven, give us something here in the office that the heads of the departments, that the nurses, the reconstruction people, that everybody can act on." We have certainly fallen down many, many times, but by expressing views held by the clinical force and held by the laboratory force, according to the best that was in them, it has enabled us to try to do something for prognosis.

Now, the biggest thing I want to ask you to do is to try a prognosis. Just one word and I will stop. Some of you know that I am a little enthusiastic over the x-ray, however, when you face the matter straight, the man who has a definite and new idea for a new method of examination sometimes has to exaggerate it. Nevertheless, I want to congratulate Dr. Brown upon what I think is a mighty fair, straight line of curves, and I wish with all my heart to say to you that I believe in them.

Dr. Ernest Zueblin, Cincinnati: I think the question of clinical activity whether or not the patient has to undergo treatment is of great significance. Besides the presence or absence of rales and other physical signs greater emphasis has to be laid upon the topographical occurrence of these abnormal sounds. Anatomical conceptions regarding the finer distribution of the bronchi in their relation to the intercostal spaces, whether or not restricted to one or more lobes, must always be present to our mind during the physical examination and the charting of signs. A clear understanding of the pathological changes, their translation into the physical signs, is an essential requirement. The clinical course with its periods of activity and intervening intervals of quiescence must leave its marks on the patient, visible or audible to the examiners well trained methods of investigation. There is hardly one sign which can be termed pathognostic, every one of them deserves our full attention, taken singly, or compared among one with another with the aid of the x-ray readings, the laboratory reports, they must contribute in the making of the diagnosis and prognosis.

I would like to ask Dr. Brown what clinical value he places in the complement fixation test. Inspired by his former and valuable contributions on that subject we have in the last two years included the complement fixation test as a routine measure. This was done for diagnostic and prognostic purposes, however no uniform opinion as to its value has been formulated. In many instances the same blood serum will react more or less intensely and differently when tested with Miller's, Petroff's, Fraser's and other tubercular antigens. While doubt is cast upon the reliability of the Wasserman technic, in our institution we carried out a number of simultaneous determinations with the Hecht-Weinberg-Gradwohl technic, the latter results showing a closer parallelism with the clinical and physical data. Furthermore I would like to ask Dr. Brown whether in his opinion he attributes any value to the blood picture, considered from the standpoint of numerical distribution of neutrophile and lymphocytic cells.

According to recent investigations in early cases a decided increase in the lymphocytes over the neutrophile elements is noticeable, the latter become prevalent with the progressive invasion and activity. A similar displacement takes place in regard to the Arneth count, namely a decided increase of the cells with two and one nuclei which is more marked in the advanced and unfavorable cases. In our opinion the study of the blood picture has some value for the prognosis of tuberculous cases.

Dr. Allen J. Hruby, Chicago: Dr. Gray, of Chicago, has brought out an interesting fact in the discussion of prognosis of tuberculosis, and that is graduated exercise. Put your patient on graduated exercise before you attempt to prognosticate his condition. At the Chicago Municipal Tuberculosis Sanitarium, we do not attempt to give a prognosis or classify the patient on dismissal from the institution until the patient has been on graduated exercise and the clinical activity of the patient studied after the graduated exercise. I believe with a patient at absolute rest the active symptoms are, of course, subsided, and that only after graduated exercise can we bring the manifestations of clinical activity closer to those manifestations of pathological activity, that is, the clinical manifestations will come out earlier on the curve than they are represented in Dr. Brown's diagram. When we exercise the patient, of course, in prognosis we have to make a general study of the patient, a physical study, a clinical study and a laboratory study. Rest in tuberculosis is like giving a patient with active symptoms of acute appendicitis a dose of morphine,—you mask all the symptoms but the pathological activity goes on just the same and after the morphine loses its effect the manifestations of clinical activity return. Rest, then, widens the interim between pathological and clinical activity.

Dr. George Mannheimer, New York: Dr. Brown, how do you value pulse, temperature and respiration-rate in determining clinical activity?

Dr. Brown: I cannot answer some of the questions that have been asked. I worked on some of the problems some years ago, but I have forgotten the figures, and I haven't them with me, unfortunately. Mr. Petroff is not here. If he were here, he could answer Dr. Zueblin's question on the complement fixation test, as he is our expert advisor on the complement fixation test. I might add that we have not studied it so much in certain details. In one way we have considered it from the standpoint of prognosis. In another way it was from the standpoint of determining whether or not the patient needed treatment. Only in these respects does it relate to prognosis. The cases we have reported are the cases which have been admitted to the Trudeau Sanatorium, where we take only early cases. I think some of the gentlemen have been referring to later cases where, for instance, crepitant rales occur much more frequently than we get them. I think they occurred in this series of 250 cases once or twice; twice, I think, only. We do not get the advanced cases.

The cases, for instance, that Colonel Bushnell calls attention to, where you get dullness down to a certain point were not present. If the rales, he holds, extend beyond that point the case is probably active, but we get

that type but rarely, because we do not admit them. It is to try to aid the practitioner in the determination of what should be done with an early case that we have undertaken this study. All of the rales, I might say, that we have considered here are what we might term "moist" rales.

In regard to Dr. Mannheimer's question, do you mean the limits of the pulse and temperatures in clinical activity?

Dr. Mannheimer: Yes.

Dr. Brown: We have been trying to do that too, but it is an exceedingly difficult study. I think we stated last year in some meeting that for a male we have taken the temperature of 99° F. and the pulse of 90, as the limits of clinical non-activity. For the female, we have taken the temperature of 99.6° and the pulse of 96 as the limits. We have been trying to study to see whether we were right or wrong in this assumption. We have not been able to determine with any degree of accuracy from the small number of cases we have brought together whether we are correct or not. We have not advanced beyond the preliminary stages with these cases, and I apologize for presenting such results to you, but the Chairman insisted that we give something.

A STUDY OF THIRTY CASES OF PNEUMOTHORAX FOUND IN THE FIRST 2000 CONSECUTIVE CASES RECEIVED AT U. S. A. GENERAL HOSPITAL NO. 19, ASHEVILLE, N. C.

By MAJOR KENNON DUNHAM

Cincinnati

Pneumothorax has occurred in 1.5 per cent. of all 2000 cases and in more than 1 per cent. of proven cases. This percentage will undoubtedly be greater the longer the men remain in the hospital. As the hospital was opened in September, 1918, no case has been under observation more than eight months. Almost all of the cases have been between twenty and thirty years of age.

Stereo chest examination is the routine at No. 19, and by its aid I have worked toward establishing certain facts: first, that partial pneumothoraces often pass undetected until autopsy, though their diagnosis is very important; second, that the relation between pneumothorax and tuberculosis and pneumothorax and empyema needs restating; third, that the often accepted belief that the large majority of cases occurs upon the left side in reality needs reversal; and fourth, that the hydropneumothorax sometimes shows a domed line instead of a level one on the x-ray plate.

This series contains many cases of unusual collapse. It is remarkable because of the large number of right-sided cases and because of the several cases of apical collapse. There is a case of double hydro-pneumothorax on the right side, one of partial collapse of both uppers, one hydro-pneumothorax between the upper and middle right, and one case containing cavity at the right apex which had an apical collapse, the apex and cavity later expanding, and still later the right lower collapsed and fluid developed in the pleural cavity.

The great difficulty of diagnosing these cases without stereo chest examination is evident. I at least feel sure that many of the unusual cases would have been overlooked by physical examination alone, and certainly unless one is looking for such unexpected lesions it would be difficult to interpret what physical findings one elicits.

I made one mistake that emphasized the difference between the findings of cavity and of pneumothorax on the x-ray plate. A case diagnosed as pneumothorax of the upper right came to autopsy, proved the diagnosis to be wrong and showed a large thin-walled cavity which had eaten out the entire upper right lobe without causing any hæmorrhage except a little streaked sputum, which was coughed up at rare intervals. There was no contraction over the cavity.

I am also reporting in conjunction with this series a case which suggested an annular shadow of Brown. Neither this case nor the large cavity suggesting pneumothorax are included in the series, but they are of value because they have both come to autopsy and help greatly in enabling us to differentiate pneumothorax and cavity. This suggested annular shadow showed first a ring of increased density near or within the apex of the lower lobe. It might have been caused by a lesion within the incisura. The density within and near the ring was not greatly different from the surrounding lung. Later this annular ring was lost within an area of increased density which could have been accounted for by the filling of an interlobar pneumothorax with pus or serum. Such a case was found at autopsy, but there was no annular shadow nor suggested cavity, only evidence of the thickening of pleura between the upper and middle lobes was shown upon the plate. At autopsy a thickened pleura was found overlying a cavity.*

This paper is a resume of the study of the tables of thirty cases of pneumothorax. Of these 30 cases of pneumothorax 17 have been proven tuberculosis, and 13 are negative or at least unproved.

Usually a series of pneumothoraces will give a much higher percentage of tuberculous cases. This is probably correctly explained by the fact that many of the cases were the result of the "flu" epidemic. Interstitial emphysema was very common last winter, and it is more than likely that pneumothorax preceded every case, but that there were many cases of pneumothorax which did not produce cutaneous emphysema. Septic broncho-pneumonia has been recognized for a long time as a cause of pneumothorax second only to tuberculosis.

The series shows 33 separate pneumothoraces in 30 cases. Twenty-five are upon the right and only 8 upon the left side. If it is best to exclude all questionable, accidental and artificial cases, we have 22 proven cases with 25 pneumothoraces. Of these 19 are upon the right and 6 upon the left side. If you deal with the 22 cases rather than with the number of pneumothoraces so that you may better compare with other tables, then we have 16 upon the right and 6 upon the left. Thus any way you consider the series we have almost three times as many right-sided as left-sided cases. The usual tables show two to one or three to two in favor of the left side. I can account for this remarkable reversal only by my method of study which I believe shows the necessity of studying lungs by systematic x-ray examination.

The partial pneumothoraces have not been described in any large series of which I know except in the recent article by Heise and Brown,* and I believe that usually they are overlooked. Individual cases have been frequently described in the last few years. This is probably the result of the more general use of the x-ray and I expect many such reports in the near future because they must be more common than our autopsies would indicate.

Partial collapse has been most common in the upper right and no case

* Reported by Dunham and Hayes in Transactions of National Tuberculosis Association, 1919.

has been found of partial collapse of the lower left in this series. This series, of course, contains no partial pneumothoraces that resulted from an operation for the relief of empyema.

Naturally, one attributes partial collapse to adhesion as so frequently demonstrated in artificial pneumothorax; but some other explanation is necessary when you study one of these cases and find collapse of upper right containing a large cavity, that later the upper lobe and cavity expand, then collapse of right base follows and the apex and cavity are fully expanded; and, finally, fluid develops at the right base. I do not know the answer.

We have one case when the apex collapsed from artificial pneumothorax. This is quite unusual especially as the upper lobe in this case was the area most involved. The plate shows a very slight collapse along the lateral wall and a marked collapse at the right apex.

The usual idea of partial pneumothorax is expressed by Norris and Landis (Saunders, 1917). "In the majority of instances a partial pneumothorax is located at some point in the lower part of the chest. Rarely it is confined to the upper portion. In the absence of classical signs a partial pneumothorax will usually escape detection until revealed by the x-ray."

Partial pneumothorax as distinct from partial lateral collapse which would be produced by an incomplete pneumothorax has occurred 15 times in 12 cases in these 2000 patients and should not be considered rare. It is so common that it should be borne in mind whenever a chest is examined which shows unusual physical signs.

A case of pyo-pneumothorax between the upper and middle right lobes is of especial interest. It drained through a bronchus, complete recovery followed. The lung entirely cleared up, leaving upon the plate only evidence of thickened pleura between the upper and middle right lobes.

This case followed an attack of "flu" as did a case of double pyopneumothorax upon the right side. There were two separate areas of collapse, one in the upper part and one in the lower part of the right thorax near the lateral wall. Both showed movable density. The lower collapse was drained and the lung almost completely expanded while the upper area was not affected by the operation and completely filled with fluid. On May 29th the upper pocket was partially aspirated. I believe that this case proves the contention of the Empyema Commission that some of the empyemas are due to small pulmonary cavities near the pleura which break, causing infection of the pleura. In this case there was marked pneumothorax with little fluid and later these pneumothoraces completely filled with pus. Thus the rupture of the lung preceded the empyema causing a pneumothorax. While many empyemas may be primary, at least this one was preceded by a rupture of the lung. It is reasonable to believe that such others occur.

*A Study of Pulmonary and Pleural Annular Radiographic Shadows, together with notes on Interlobar Fissures.—H. L. Sampson, F. H. Heise, and Lawrason Brown. American Review of Tuberculosis, January 1919. Trudeau Sanatorium, Trudeau, N. Y.

Great care has been taken not to include any possible cavities in this series. That is why the three cases have been classed by themselves as questionable. Not that I have the slightest doubt that they are pneumothorax, but they might not be so classed by other observers. Cavities are much more common than pneumothoraces and should always be thought of first. It is, therefore, possible that I have overlooked some cases of pneumothorax which will develop later, but post mortems which have been carefully studied by Lieutenant Hayes and myself cause us to believe that when one is in doubt it is much safer to diagnose a cavity than a pneumothorax. Of these 2000 cases, in those which have come to autopsy, the x-ray has never found a cavity which has not been corroborated, but many cavities have not shown upon the plate.

It is not safe to localize a lesion and differentiate the lobe in which it lies by means of the ribs. A lesion if possible should always be located by the trunks to the various lobes. This can be done unless the density is so great as to obscure the lung markings. This will prevent many mistakes to which the imagination stimulated by an x-ray plate can easily lead us.

Certainly this series of cases, as well as all others, must lead to the conclusion that tuberculosis is the greatest of all causes of pneumothorax, but it is far from being the only cause.

We all know that non-tuberculous spontaneous pneumothorax supposed to be due to emphysema is frequent, but no case has been found in this hospital. Last winter has proved how frequently broncho-pneumonia ("flu") not associated with tuberculosis can cause this lesion. We have had 13 negative cases out of 30 and I believe that broncho-pneumonia accounts for most of them. Most of these cases have given history of "flu," but have been sent to us long after the acute attack has subsided, and before pneumothorax was suspected. This must be considered as an opinion, not as proven, but septic broncho-pneumonia is the most frequent cause of pneumothorax next to tuberculosis.

Accidental pneumothorax is very common although only one case appears in this series. The exploratory needle is the usual cause of the accident. It is often overlooked by the operator unless found by the x-ray, and the amount of damage done is also usually underestimated or attributed to other causes.

The percentage of pneumothorax will necessarily increase in any series which is taken from a tuberculosis hospital, which has a large number of advanced tuberculosis cases. Also the percentage will increase, the more carefully the patients are examined and the greater the number of post mortems obtained and carefully made. The x-ray is the examination of choice to prove this diagnosis. I am sure that many of these cases would have been overlooked had not a careful x-ray examination been made in every case, for, first it stimulates the examiner to be more careful, and second, when properly made it finds the lesions.

Careful correlation between the x-ray and physical findings has led us to believe that partial pneumothorax is the rule rather than the exception and that apical pneumothorax is not uncommon, although we have

found no case at autopsy. When the clinician knows these unusual lesions are usual, he thinks of them when he runs across movable dullness at places other than the bases or when he finds hyper-resonance associated with distant breath sounds. Such knowledge produces keener diagnosis.

Hydro-pneumothorax must always be frequent in any pneumothorax series, especially if we are dealing with tuberculosis or septic bronchopneumonia. Both infections cause exudation, but in any case nature abhors a vacuum and the compression of the lung tends to passive congestion. It is, therefore, to be expected that most cases, if the pneumothorax continues sufficiently long, will develop fluid or pus.

In this series we had 15 cases of hydro-pneumothorax and 15 cases without fluid. Fluid developed in more cases the longer they were observed. In time, therefore, one would expect that the lung would expand or fluid would develop. Thus few simple pneumothoraces are found at autopsy. But movable dullness or movable density will frequently not be found during life because there is no fluid.

The x-ray picture of hydro-pneumothorax with the patient in the upright position is a horizontal line with decreased density above and increased density below. The more nearly the principal ray passes through the level of the fluid the more level and sharp is this dividing line. This is natural because water seeks its own level and the nearer the principal ray passes through that level, the greater the difference of density, because then the x-ray receives its greatest obstruction at the surface.

I have recently observed an interesting phenomenon. Beginning pneumothoraces which have just sufficient fluid to cover the diaphragm give a line which suggests the curve of the diaphragm. The phenomenon is more apparent when the tube is higher. I believe that this curved line, which suggests that fluid does not always seek its own level, is the result of the ray passing through the outer top edge of the fluid where it is very thin without sufficient rays being absorbed to record a density. Thus the higher the tube the greater apparent curve.

I have proven that the domed density was fluid by having the patient lie upon his side. Fluid in left thorax gives: First, upright position. Fluid not level but domed, suggesting diaphragm. Second, lies upon right side, fluid not seen as it is concealed by lung, heart and mediastinum. Not much fluid. Third, lies upon left side. Fluid seen lying along left thoracic wall.

There have been very few artificial cases in this hospital because it is the general opinion that the Surgeon General's Office believes that therapeutic pneumothorax should be limited to the relief of hæmorrhage. The purpose of reporting them in this series is to show the nature of the collapse, not the value of artificial pneumothorax as a therapeutic measure.

Five cases are reported. One was accidently produced by the aspirating needle. This is a remarkably good showing for the work alone. It is a non-tuberculous case, now well, and collapsed at the lower right.

Compare the four cases collapsed for therapeutic reasons. The right upper collapsed in two, and complete collapse in two cases, one upon the right and one upon the left. Apical collapse due to artificial pneumothorax was entirely new to me. I had never noted it either in my practice nor in the literature.

The three questionable cases of course are all partial. One was in upper right, one upper left and one lower left. I wish to repeat that in my opinion they are not questionable.

Reports of the condition of these patients have very little real value because many of them will probably grow progressively worse. Most of the cases due to acute infection will probably recover. Some of the so-called negative cases are expected to grow worse as they are undoubtedly tuberculous. Twenty-two of the 30 are so clinically diagnosed.

These few facts and queries, suggestions and opinions represent what I consider the wheat, obtained from threshing out the 30 cases of pneumothorax from the first 2000 consecutive cases received at U. S. A. General Hospital No. 19. It is a large series made up under peculiarly favorable conditions of carefully correlated roentgenological and physical examinations, repeats, and with recording and statistical advantages, and I hope the grain obtained will prove nourishing.

SPONTANEOUS PNEUMOTHORAX

THREE CASES WITH INTERESTING FINDINGS

By CAPT. EVERETT MORRIS, M.C.

New Haven

Reporting pneumothorax cases in which changes occur that are unusual is always justified. In the cases reported here several conditions were found which are worthy of consideration. In the first case, J. M. H., the following points deserve attention: The degree of lung collapse, the amount of displacement of mediastinum, the displacement of diaphragm and the fact that the serious complication occurred without pain and extended over a period of 32 days. The second case, S. G. N., was an induced pneumothorax, for the purpose of controlling hemorrhage, and with a super-imposed spontaneous pneumothorax. The third case, J. S., is that of a pyo-pneumothorax, with marked displacement of heart and mediastinum, and with marked lung collapse. A study of the cases themselves, inasmuch as they give a complete history with physical, radiographical, pathological and bacteriological findings is of interest. The purpose, therefore in reporting these cases appears to be warranted.

In a review of the literature and statistics, certain points were found to be of sufficient value to justify their inclusion here.

Spontaneous pneumothorax appears to be a condition found in early life, occurring almost invariably before the age of forty (Nikolsky, Frissell and Riesman)[1] and occurs more frequently in males than in females in the proportion of five to one (Nikolsky, Frissell, Reisman, Finley, Drasche and James).[2] The duration of the condition is from weeks to years. Bittorf[3] reports a case in which the condition had probably existed for 25 years. Raymond, Saussier and Weil[4] noticed this condition occurred more frequently on the left side. The recurrence of spontaneous pneumothorax is not uncommon. Hammond quotes Gaff, who reported a case that had four attacks, and also Sale, whose patient had eleven attacks during six years. Double pneumothorax is more rarely found (Marshak,[5] Hammond[6]). Cases of bi-lateral pneumothorax where attacks have occurred first on one side then later on the other side are less rare. Myers[7] reports one case of his own due to emphysema and cites a similar case reported by Staehelin.

Great divergence of opinion exists among writers regarding the frequency of pneumothorax in tuberculosis. Musser[8] quotes Saussier who found 81 cases due to tuberculosis and 29 to empyema in 120 cases of pneumothorax which gives approximately a percentage of 67 due to tuberculosis. Gammons,[9] in studying 6000 cases of tuberculosis, found only six cases. Morse[10] believes that at least 70 per cent. of the cases of

pneumothorax are tuberculous and Stephens[11] thinks that 90 per cent. of the cases result from a rupture of a tuberculous cavity into the pleura. The figures of Norris and Landis[12] are much lower. They believe that not less than 30 per cent. of all pneumothoraces are associated with tuberculosis of the lungs, and that as a complication in tuberculosis pneumothorax can be expected in about 5 per cent. of all cases. Powell[13] reports that about 6 per cent. of the fatal cases of tuberculosis died with a pneumothorax. Williams[14] finds it 10 per cent. and Weil[15] 13 per cent. At the Montefiore Home, as quoted by Fishberg,[16] it is found in a dozen cases annually among 300 treated. In the annual report for 1917 of the Chicago Municipal Sanitarium, four cases are reported out of 1579 patients treated. Emerson[17] quotes the following: Biach .73 per cent.; West 5. per cent.; Chambers 3.7 per cent.; Lebert 5 per cent.; Galliard 2.06 per cent.; Drasche 3.49 per cent. By far the most interesting statistics are given by Biach and quoted by Emerson[18] in which 918 cases are tabulated. This gives a percentage of 77.8 as being due to tuberculosis:

Phthisis	715	Ascaris lumbricoides in pleural cavity	2
Gangrene of lung	65	Rupture of encapsulated peritoneal effusion	1
Empyema	45	Hydatid of lung	1
Injury	32	Caries of ribs	1
Bronchiectasis	10	Caries of sternum	1
Abscess of lung	10	Rupture of bronchial glands	1
Emphysema	7	Abscess of breast	1
Gangrene from infraction	4	Fistula between pleura and colon resulting from hydatids	1
Paracentesis, thoracic	3	Uncertain causes	14
Perforation of oesophagus	2		
Perforation of stomach	2		

In the cases reviewed at this hospital in various stages of the disease, the majority of which are discharged to duty as non-tuberculous, arrested and healed cases of tuberculosis, the percentage of pneumothorax occurrences can be reckoned on either the total number admitted, which would be an unjust basis of computation, or on the number found definitely to be tuberculous. The percentage given here is based on the latter. There were reported during the period of one year 17 cases of spontaneous pneumothorax among the following class of cases:

Location of lesion	*No. of cases*	*Location of lesion*	*No. of cases*
Left upper	35	Right upper, middle and lower and left upper	38
Left lower	3	Right upper, middle, lower and left lower	1
Left upper and lower	19	Right upper and middle and left upper	15
Right upper	75	Right upper and lower and left upper	9
Right middle	1	Right upper and lower and left lower	2
Right lower	3	Right upper and left upper and lower	42
Right upper and middle	13	Right middle and left upper and lower	2
Right upper and lower	8	Right lower and left upper and lower	4
Right upper, middle, lower	14	Right and left upper and lower	10
Right and left upper	95	Right upper and middle and left upper and lower	5
Right middle and left lower	1	Right middle and lower and left upper	2
Right lower and left lower	1	Right upper, middle and lower and left upper and lower	41
Right lower and left upper	1		
Right upper and left lower	7		
Right lower and middle and left upper	1		
Right lower and middle and left lower	1		

Up to the first day of May, 1919, 1545 patients in all have been admitted to the hospital; of these 449 patients had active lesions as tabulated above, 187 had inactive lesions and the remainder of the cases were under observation for tuberculosis or were admitted with other diseases. The percentage of spontaneous pneumothorax occurring in this hospital does not agree with the general average found elsewhere which is 4.85 per cent. Here we find 2.65 per cent.

J. M. H., Case 1. White male, 26 years. Private, Med. Dept. Admitted Sept. 18, 1918. Died Dec. 11, 1918, at 10.50 p. m. Autopsy No. 27.

Clinical History:

Patient admitted to U. S. A. General Hospital No. 16 complaining of cough with expectoration, loss of weight, fever, night sweats and constipation.

Family History: Father living and well, but blind; two brothers died in infancy.

Past History: Patient has always lived on farm. Had whooping cough, measles, chicken pox and small pox in childhood; typhoid fever at 22; and malaria, the latter lasting two years. At twelve years of age injured right hip-joint playing ball, after which he was in bed nine months and walked with crutch one and a half months. Gonorrhea at 21 lasting three months. Complete recovery.

Present Illness: Patient entered the service July 22, 1918, and was sent to Fort Oglethorpe, where a cold developed almost at once. After eight days he reported at sick call, but was sent back to duty. Three days later reported sick again. Unable to drill except for eight days while at the fort, remaining sick in quarters until transferred to Camp Custer August 21. In base hospital there and after ten days transferred to the tuberculosis ward, where he remained until sent here.

Physical Examination: Temperature 101.6, pulse 100, and respirations 28. Patient is fairly well nourished. Anterior and posterior cervical, epithrochlear and inguinal glands palpable. *Heart:* apparently normal in size, location and rhythm; rate rapid; no murmurs. Flexion of right hip limited to 90 degrees. *Thorax:* chest broad, long and shallow. Depressions above the clavicles and scapulae slightly prominent. A slight scoliosis. Right shoulder is drooping and there is slight lagging and diminished expansion. *Lungs:* On the right, increased vocal fremitus above third rib and eighth dorsal spine and dulness above second rib and seventh dorsal spine. On the right, increased vocal resonance and bronchovesicular breathing above third rib and fourth dorsal spine and subcrepitant rales above third rib and fifth dorsal spine with indeterminate rales from base to fifth dorsal spine. Left lung negative.

Clinical Diagnosis: Tuberculosis, pulmonary, chronic, active, right upper lobe, third rib and fifth dorsal spine up. Sputum positive for tubercle bacilli; blood, urine and feces negative.

Oct. 31 process extended throughout right lung, and on the left from the second rib and second dorsal spine up.

The case ran a rapidly progressive course and on November 9, after a paroxysm of cough, the following physical signs were noted: *Inspection:* Right chest bulging; intercostal spaces widened and distended; diminished expansion to the extent of immobilization. *Palpation:* Diminished vocal fremitus throughout; trachea deviated to left. *Percussion:* Right, tympanitic throughout and 2½cm. below the margin of the costal arch and 2½ cm. to the left of the sternum from the sixth to the fourth rib up. Dulness in the interscapular region from the seventh dorsal spine up. Coin test throughout. *Auscultation:* Right, amphoric and cavernous breathing with whispered pectoriloquy except over the interscapular region, from the seventh dorsal spine up, where bronchovesicular breathing and a few indeterminate rales were heard. Left, exaggerated breathing with indeterminate rales between the sixth and third dorsal spines. Heart displaced to the left; apex in fifth interspace, 2½ cm. to the left of nipple line. Liver also displaced downward and to the left.

Diagnosis: Spontaneous pneumothorax on right.

It is interesting to note the absence of pain and dyspnoea, usually attending such complications. Patient was most comfortable when lying on his left side.

Nov. 11, 1918. Blood pressure: Right arm—systolic, 90; diastolic, 58; pulse pressure, 32. Left arm—systolic, 90; diastolic, 80; pulse pressure, 10.

Nov. 13, 1918. General condition poor; pain in epigastric region; expectoration lessened; one involuntary bowel movement during the night; pulse irregular.

Blood pressure: Right arm—systolic, 84; diastolic, 54; pulse pressure, 30. Left arm—systolic, 100; diastolic, 54; pulse pressure, 46.

When right arm was extended above head, pulse became almost imperceptible.

Nov. 16, 1918. Blood pressure in both arms: systolic, 86; diastolic, 58; pulse pressure, 28.

The blood pressure from this date remained practically the same in both arms.

Nov. 18, 1918. General condition poor; eats and sleeps little; productive cough; sweats profusely; opiates necessary to relieve pain in abdomen.

Dec. 9, 1918. Cavernous breathing and whispered pectoriloquy more distinct than at first examination; amphorophony distinct. Patient gradually became weaker.

Dec. 11, 1918. Patient died.

RADIOGRAPHIC REPORT:

First radiogram taken Oct. 15, 1918: Right lung shows marked increase in density of an irregular, coarsely mottled type extending from mid-hilus out to axilla between the second rib and third interspace. Region of apex and first interspace occupied by interlacing annular shadows, well outlined. Below the area of mottling, there is a triangular area of density

with very few lung markings apparent, the apex of which is in the axilla, its base at the diaphragm and outer border of the ribs. The inner border is made up of an area of mottling, fibrosis and hilus changes. Right hilus markedly enlarged, parallel to mediastinum, the outlines of its borders lost in areas of mottling and extensive peribronchial thickening at the base.

Left lung with exception of some hilus thickening and slight calcification, shows no changes.

Trachea and vertebral column somewhat displaced toward the right.

Heart slightly enlarged but normally situated.

Diagnosis: Advanced tuberculosis throughout entire right lung. Cavitation at apex. Possible beginning pneumothorax right base.

Second radiogram taken Nov. 10, 1918. Right lung shows marked increase of transparency with exception of quadrangular shaped area extending from mammary line first space to fourth rib. Within this area of density there are annular areas of considerable transparency, occupying the upper half. Extending out from the upper and outer angle to the thoracic wall is an opaque band.

Left lung shows increased density throughout. Pulmonary markings not distinguished. A triangular shaped area of transparency is seen situated at the inferior aspect, close to the vertebral column, its apex in the diaphragm and extending up about six inches between the inner border of the lung and the right side of the heart.

Mediastinal structures and trachea markedly displaced to the left.

Heart outlines show that the heart is markedly displaced to the left.

Diaphragm on right so low that the twelfth rib is clearly defined. Interspaces markedly increased. Diaphragm on left not clearly defined.

Diagnosis: Pneumothorax. Collapsed lung on right. Cavitation upper half right lung. Adhesions from this part of lung to parietal pleura. Marked displacement of mediastinum and heart. Left lung pathology questionable.

Third radiogram (lateral view) taken Nov. 12, 1918. Lateral view shows mediastinal contents displaced posteriorly from sternum. The sternum can now be distinctly made out and likewise the full extent of the pneumothorax from above downward is revealed. The entire right chest cavity is ballooned out by this extensive air infusion.

Fourth radiogram taken Nov. 22, 1918. Right lung now shows that the quadrangular area of density which was present before has become triangular, with the base still formed by the band of adhesions across the first space and the apex in the region of the fifth rib. The annular shadows seen before are distorted as if partially collapsed. The mediastinal contents and heart form a homogeneous shadow extending out to the left axillary line. Likewise the previous transparency has become somewhat hazy suggesting beginning formation of fluid.

Fifth radiogram taken Dec. 3, 1918. Both lungs now show a general hazy density indicating an increase of fluid on the side of the pneumothorax. The lower portion of the right lung is more collapsed than at previous examination. Annular shadows barely determined. Adhesions

at right lung apex still prevent a complete collapse. Left lung likewise shows marked congestion. Hilus markings can be seen through heart shadow. Heart does not seem to be displaced as at previous examination.

Sixth radiogram taken Dec. 5, 1918. There seems to be more fluid present and less air and also a slight recession of the mediastinal contents. Cardiac displacement not so marked. Congestion as described on previous examination still present.

Seventh radiogram (post-mortem) taken Dec. 12, 1918. The examination shows a pneumothorax only extending to the tenth rib. Diaphragm has ascended. Collapsed lung distinctly made out, tongue-shaped. Annular shadows in collapsed lung not determined. Fluid present. Left lung shows intense congestion. Considerable peribronchial engorgement.

AUTOPSY:

Body: That of a well-built but markedly emaciated white male adult, about 180 cm. in length. Rigor mortis is absent and there is moderate lividity of the dependent portions. The skin of the abdomen presents greenish discoloration. The pupils are widely dilated; the right more so than the left. The skin over the left angle of the lower jaw is slightly ulcerated. There is no general glandular enlargement or oedema of the extremities.

Peritoneal cavity: The abdominal muscles are very dark in appearance. The peritoneal surfaces are smooth, moist and glistening. The gastro-intestinal tract is distended and there is no abnormal displacement of the organs.

Thorax is symmetrical and large. The sternum is not prominent and the costal angle is obtuse. The intercostal spaces on the right side are partially obliterated and on the left side are markedly depressed. In order to determine the presence of air in the pleural cavities, the abdominal viscera are removed, and the abdominal cavity filled with water. Puncture is made through each dome of the diaphragm, and air bubbles are obtained from the right side but none from the left. On opening the thoracic cavity the heart is found displaced almost entirely to the left of the median line.

Left pleural cavity: The pleural surfaces are markedly injected and somewhat dry in appearance. There is no fluid present.

Right pleural cavity: The pleural surfaces are everywhere thickened and covered with thick, adherent, greenish yellow exudate which forms a membrane extending over the pleural surfaces, diaphragm and lung. The cavity contains approximately a litre of greenish purulent fluid, sufficient in quantity to cause the posterior part of the right diaphragm to protrude into the abdominal cavity, as the subject lies in the dorsal position. The upper portion of the pleural cavity contains numerous firm and also friable adhesions extending from the parietal to the pulmonary surface. The adhesions, when broken, cause laceration of the pulmonary tissue.

Pericardial cavity: Appears normal on inspection.

Lungs: Left—It is collapsed, scarcely filling half of the pleural cavity. Both lobes are dark red in color and the lower half of the upper lobe is atelectatic, this portion being firm, purplish in color and airless. No areas of atelectasis are found in the lower lobe. Crepitus is diminished throughout the lung but on palpation many small nodules can be felt giving to the lung a distinctly pebbly character. On section a large quantity of frothy blood-stained fluid escapes. Projecting from the cut surface numerous minute tubercles are seen, which on the whole are discrete. No confluent tuberculous areas or areas of caseation are encountered.

Right—This lung is markedly contracted and covered with a thick exudate, as above noted. The pulmonary tissue is extremely friable lacerating on the least manipulation. Projecting from the central, external lateral portion of the pleura is a thickened portion of the membrane somewhat tubular in character and simulating very closely a bronchial branch protruding through the pulmonary tissue. However no cartilage can be palpated here. The free portion contains a lumen through which air is readily expressed. On section, however, this tubular structure is found to lead into a small cavity which communicates with adjacent cavities and also with a small bronchus, which, however, is not identified with great certainty, owing to the changes present. Cut surface of the lung is greyish yellow and markedly purulent in character. No normal lung tissue can be found. The lobes are matted together in one mass and the upper portion of the lung is entirely replaced by many thin-walled and communicating cavities which are filled with a material similar to that found free in the pleural cavity.

The hilic lymph nodes are only moderately enlarged, deeply pigmented and the few that are examined show no gross evidence of tuberculosis. *Note:* the thoracic contents are removed in toto for purposes of preservation and future sectioning.

Spleen: It is somewhat enlarged and weighs 140 grams. The capsule is smooth, purplish in color and presents no areas of thickening or adhesions. It is firm in consistency. Cut section is dark red and surface scrapings are scanty in amount. There is no evidence of tuberculosis present.

Pancreas: Weighs 55 grams and it is firm in consistency and greyish yellow in color. The lobules are well marked and closely placed.

Liver: It appears small and weighs 1140 grams. It is dark brown in color and the surface is smooth throughout. Cut surface also is dark brown and mottled. The lobules are very distinct. There is no evidence of tuberculosis present. The gall bladder is somewhat distended; otherwise normal.

Kidneys: Their combined weight is 355 grams. They are moderately injected and on section drip fluid blood. The cortex measures 5 to 7 mm., the pyramids are normal in number and appearance and the pelves are normal. The capsules strip readily exposing a smooth appearance.

Adrenals: Appear slightly enlarged but otherwise are normal.

Pelvic Organs: The bladder is distended with urine and the mucosa is pale green in color, presenting no areas of injection. The prostate is normal in size and consistency, and on section is not remarkable. The prostatic urethra is also normal, as well as the seminal vesicles. The external genitalia are normal.

Gastro-Intestinal Tract: The stomach is slightly distended and contains a quantity of yellowish, adherent mucus-like material. The rugae are partially obliterated. There is no evidence of injection or ulceration, although an occasional area, suggesting post-mortem change, is present. The small intestine throughout contains a large quantity of yellowish mucus-like material similar to that found in the stomach. No ulcerations are found. The lymphoid tissue is prominent and the Peyer's patches are so dark in color as to suggest pigmentation. The mesenteric lymph nodes are slightly enlarged and also present a similar, pigmented appearance. The appendix is normal, as is also the large intestine.

Aorta: See thoracic contents.

Anatomical Diagnosis

Pulmonary tuberculosis right lung with marked cavity formation. Miliary tuberculosis left lung.

Pyopneumothorax on right.

Atelectasis of lung on left.

Chronic pleuritis.

Acute congestion of spleen, liver and kidneys.

Pigmentation (?) of mesenteric lymph nodes and intestinal lymphoid tissue.

Superficial ulceration of face.

Bacteriology:

Ante-mortem cultures—blood:

Nov. 23 Diplococcus gram positive, doubtful Type II.
Nov. 27 Similar organism.
Dec. 6 Sterile.
Dec. 11 Sterile.

Post mortem bacteriology:

1. Spleen
   a. Smear negative for organisms.
   b. Culture negative for organisms.
2. Pleural
   a. Pneumococci and tuberculosis smear.
   b. Pneumococci Type IV.
3. Heart Blood
   a. Smear negative.
   b. Culture negative.
4. Lung
   a. Smear pneumococci and bac. tuberculosis.
   b. Culture pneumococci Type IV.

Microscopical Notes:

Lungs: Several sections were made of the lungs, most of which included the walls of old tuberculous cavities. As usual, they show a great deal of fibrous tissue in which the alveoli are markedly deformed and their epithelium cubical in shape. At one place the wall of the cavity involves the pleura which grows thinner, although no actual point of perforation can be found in the pleura that is included in the section; the lining of the cavity throughout is a necrotic, caseous material in which an occasional small vessel undergoing extensive obliterating changes is located. Another section of the lung is perhaps more interesting since it contains several thousand nodules and one of these located in a bronchus; the epithelium of the bronchus is only present on one side. The other side, which bulges into the lumen is a mass of caseous material and from here in all the alveoli surrounding the bronchus there is a caseous exudate. The pleura shows a shaggy, necrotic exudate in which no definite tubercles are found, but the exudate is being necrosed in a way which suggests tuberculous exudate.

Liver: The liver cells about the hepatic venules are atrophic and the intervening capillaries are distended. The liver cells otherwise show no peculiarity.

Spleen: The splenic pulp is considerably congested.

Kidneys: All of the vessels of the kidney are engorged with blood.

Testes: The tubules of the testes show no spermatogenesis. There is, however, no increase of fibrous tissue between the tubules and the basement membrane is not thickened.

S. G. N., Case 2. Colored male, 31 years old. Corporal, Co. 11, 301 Stev. Admitted Sept. 18, 1918. Died Jan. 15, 1919 at 8.55 p. m. Autopsy No. 35.

Clinical History:

Admitted to U. S. A. General Hospital No. 16, complaining of slight cough and expectoration.

Family History: Mother died of tuberculosis at 36.

Past History: Home conditions poor. Pertussis in 1901. Measles, mumps, pneumonia and pleurisy in 1918. Gonorrhoea 1917.

Present Illness: Inducted into the service Oct. 1, 1917 and sent to France. On Jan. 6, 1918 took cold and was sent to Base Hospital No. 101, where he had pneumonia and pleurisy on right; remained there until Jan. 31, and then returned to duty. On Apr. 27, 1918 returned to hospital with cough and temperature and again returned to duty June 10, 1918. On July 14 sent to Hospital No. 11 with cough and fever, remaining until Aug. 15, when he was transferred to Base Hospital No. 8; remained until Aug. 31; then sent to hospital at Ellis Island and then here. During illness has had cough, hemoptysis, expectoration, loss of strength and loss of weight.

Physical Examination: Maximum weight 152 pounds; now 150. Post-cervical glands palpable. *Heart:* normal. *Thorax:* depressions

above and below clavicles. Short, broad chest; drooping right shoulder; diminished expansion on right side. *Lungs:* on right, dulness from second rib and second dorsal spine up; on left dull above clavicle. On right, bronchovesicular breathing from second rib and second dorsal spine up and diminished breathing over base on right. On left, bronchovesicular breathing from third rib and third dorsal spine up with increased voice sounds over area of dulness. Subcrepitant rales over all lobes anteriorly and from fourth dorsal spine posteriorly on right.

Clinical Diagnosis: Tuberculosis, pulmonary, chronic, active, all lobes of right lung, and inactive on left, third rib and fourth dorsal spine up.

Oct. 4. Patient developed influenza.

Oct. 15. A diagnosis was made of tuberculous pneumonia on right.

Oct. 17. Large amount of yellow sputum with foul odor first noticed.

Oct. 18. Signs of cavity right upper lobe found. Examination of the lungs now shows an amphoric quality of breath sounds and whispered pectoriloquy, previously heard above fifth rib on the right, but less distinct.

Oct. 23. Sputum examination: elastic fibers 20 per cent. by volume. Tubercle bacilli found on only one examination and negative on eleven examinations. Malaria and Wassermann negative. White blood corpuscles ranged from 16,200 on Oct. 10 to 14,000 Jan. 11.

Nov. 1. Lung examination shows pneumonic area much improved.

Nov. 15. Lung examination now gives dulness above fifth rib and fifth dorsal spine with bronchovesicular breathing; pectoriloquy and marked signs of cavitation have largely disappeared. On the left there is dulness and bronchovesicular breathing above second rib and third dorsal spine.

Nov. 17. Patient has hemoptysis and vomits blood; amount of blood lost approximately 60 cc.; blood pressure, systolic 120; diastolic 60.

Nov. 23. Blood pressure, systolic 108; diastolic 60. Hemorrhage at irregular intervals about 30 cc. in amount.

Dec. 31. Artificial pneumothorax instituted to stop hemoptysis; needle introduced in the sixth interspace in mid-axillary line on the right. Readings: negative pressure (centimeters of water) 4 to 1; 750 cc. of air introduced, followed by a positive reading of 6 to 7. Patient continued to bleed.

Jan. 2, 1919. Introduction of air again resorted to; needle introduced at same site; pressure, negative 2 to positive 2; 900 cc. of air given, which brought the pressure to zero, positive 2.

Jan. 7. Patient raised four ounces of bright-colored blood. Air again introduced, 800 cc. in amount, on same side. Readings: minus $1\frac{1}{2}$ to plus 2, before introduction and plus $3\frac{1}{2}$ to plus 4 afterwards.

Jan. 9. Patient lost 200 cc. bright-colored blood. Blood examination shows hemoglobin 70 per cent.; red cells, 4,500,000; white cells, 12,000; coagulation time $8\frac{1}{2}$ minutes as compared with $4\frac{1}{2}$ in three controls.

Jan. 10. Air again introduced in fifth interspace in the mid-axillary line. Readings: negative $1\frac{1}{2}$ to plus 1. 900 cc. of air given followed by a reading of plus 9 to 11.

Jan. 11. Had fairly good night. One-fourth grain half morphia given. Physical examination: positive coin test present throughout front on right and extending across the sternum to one or two cm. to left of sternal border and from the twelfth to the fourth dorsal spine.

Jan. 13. Patient has had no hemoptysis. Transferred to another ward; after transfer, became pulseless, dyspnoeic, semi-comatose and apparently in extremis.

Jan. 14. Patient had a bad night; dyspnoea to the point of air hunger. Physical examination showed positive coin test and hyper-resonance extending from base to clavicle and to 6 cm. to left of mid-sternal line, and posteriorly 3 cm. below twelfth rib and to the third dorsal spine. *Heart:* left border is 15 cm. to left of sternal line. Complication spontaneous pneumothorax.

Jan. 15. Died.

Radiographic Report:

Radiogram taken to determine presence and extension of tuberculous process, Sept. 30, 1918:

Right lung shows a marked increase of density, of a diffuse, even nature, extending from the hilus outward, between the second and fifth ribs. Apex not clear.

Left lung shows a hazy increase of density with some peribronchial thickening. Left apex is denser than right. Hilus not determined.

Diaphragm irregular on the right; at the sixth rib. On the left, at the sixth space.

Heart slightly enlarged.

Diagnosis deferred. Repeated examination in one week requested.

Second radiogram taken Oct. 12, 1918: Density on right very diffuse and marked, is equal to that of the heart and extends from near the base to the apex. Greatest density seen in outer half of upper lung. Mediastinum and heart outline obscured on base density.

On the *left* definite peribronchial markings.

Heart about the same as at previous examination. Condition the same.

Diagnosis: Process resembles a pneumonia; but in conjunction with clinical findings is probably a tuberculosis: Congestion plus hemorrhage.

It is seen therefore that a definite diagnosis of tuberculosis was never made.

The following radiograms were taken during patient's illness from influenza and later pneumonia.

Third radiogram taken Oct. 16, 1918: Right lung shows a marked, more or less even density throughout; most marked between the fourth and first ribs, and practically obscuring the heart outline.

Left lung shows a slight hazy density throughout the upper part.

Diaphragm outline on the right slightly obscured; high; at the fourth space. On the left at the sixth rib.

Heart slightly dilated.

Fourth radiogram taken Oct. 17, 1918: Right lung shows a marked increase of density, more or less irregular throughout the lung; most marked between the fourth and second ribs, confluent with the hilus and extending to the periphery. Density is as great as that of the heart.

Left lung shows a compensatory emphysematous condition with a few diffuse peribronchial markings.

Hilus is slightly increased in density.

Diaphragm on the right high; at the fourth space; outline slightly obscured. On the left at the sixth rib.

Heart dilated; most marked right auricle and left pulmonic area.

Thorax shows some retraction on right and ribs show a slightly greater downward angle.

Fifth radiogram taken Oct. 23, 1918: Right lung shows slightly less density throughout. Apex and base clearer.

Left lung shows less transparency.

Diaphragm on the right at the fifth rib; more distinctly seen. On the left not so low; at the fifth space; slightly more dome-shaped.

Heart about the same.

Sixth radiogram taken Oct. 26, 1918: Condition practically unchanged from that of Oct. 23.

Seventh radiogram taken Oct. 29, 1918: This radiogram was taken with patient on the back. Radiogram shows greater density posteriorly than was previously seen anteriorly. Otherwise condition is the same as seen on Oct. 26.

Eighth radiogram taken Oct. 30, 1918: Density throughout *right* lung same as seen on Oct. 26. The *left* lung, however, shows a greater even, hazy density throughout.

Hilus also is a little denser and larger.

Diaphragm shows less contrast between left and right.

Heart slightly less dilated.

Ninth radiogram taken Nov. 4, 1918: Resolution is very slow. *Right lung* remains dense in middle portion. Density on *left* is about the same. *Diaphragm and heart* about the same.

Tenth radiogram taken Nov. 13, 1918: Lung on *right* shows that the middle portion of density is becoming more sharply demarcated. There is a distinct interlobar pleural thickening visible. Density throughout lung not so marked. Shows a distinct improvement.

Underlying lung condition, from a tuberculous point of view, cannot be determined while acute process is present.

Eleventh radiogram taken Dec. 30, 1918: This radiogram was taken six weeks after resolution was evident and after the right lung showed a distinct improvement. Radiograms taken before pneumothorax was induced.

Hazy increased density throughout both lungs. Density, however, is very marked and as even as that of the heart from the fourth rib to the apex on the *right*. Base shows considerable diffuse peribronchial

thickening. Heart outline on right obscured except the extreme base.

Left lung shows its greatest density in the upper half.

Diaphragm somewhat flattened; irregular; at the fifth rib on the right; on the left, at the fifth space.

Heart slightly displaced to the left and slightly dilated.

Diagnosis: Pneumonia; probably tuberculous in origin.

Twelfth radiogram taken Dec. 30, 1918: Radiogram taken same day after injection of gas at base.

Excepting for a marked transparency some 8 cm. in diameter at the right base and a greater displacement of the heart to the left, condition is the same thoughout both lungs.

Thirteenth radiogram taken Jan. 6, 1919: After further injection of gas at the right base.

There is now definite downward displacement of the diaphragm and the line of collapse is distinctly seen, sharply demarcated, extending from the inner third of the diaphragm and running obliquely upward and outward to the axilla. Heavier opaque bands are evident from here upward. The rest of the lung remains the same.

Heart shows greater dilatation of pulmonic area.

Diaphragm somewhat lower on left.

Fourteenth radiogram taken Jan. 10, 1919: After further introduction of gas.

There is now seen a much larger area of marked transparency extending to right border of sternum, tenth rib, posteriorly upward to seventh rib, and then obliquely upward and outward to second rib, front.

Diaphragm only discernible at its medial and middle portion and seen very low (seventh rib) but is not visible at its outer portion although the lateral outline of the ninth and tenth ribs is clearly made out.

Heart and mediastinum outline displaced to left to a marked degree.

Fifteenth radiogram taken Jan. 11, 1919: Condition about the same. Greater detail of left lung is seen. Shows a distinct compensatory condition, the diaphragm being at the seventh rib anteriorly.

Sixteenth radiogram taken Jan. 16, 1919 (post mortem): Shows area of lung collapse more distinct extending from twelfth rib posteriorly to seventh rib and then obliquely upward.

Diaphragm is seen below the twelfth rib.

Mediastinum and heart show a greater displacement to the left than previously indicated.

AUTOPSY:

Body: That of a well developed, well built Negro, 181 cm. in length. The pupils are equal and moderately dilated. There is a large scar over the upper third of the right leg.

Peritoneal cavity: On opening the abdomen a thick layer of subcutaneous fat is found. The peritoneus is everywhere found to be smooth and glistening. The liver is pushed down by the diaphragm which

bulges out plainly at the rib margins on the right side. A needle shows the presence of air in the right pleural space.

Thorax: There is about 500 cc. of greenish yellow fluid in the right pleural cavity.

Pericardial cavity: There is about 50 cc. of fluid in this cavity.

Heart is large and weighs 355 grams. The valves are apparently normal as are the coronaries. The following measurements are taken.

Circumference of aortic orifice, 7.0 cm.
Circumference of pulmonic orifice, 7.0 cm.
Circumference of tricuspid orifice, 9.0 cm.
Circumference of mitral orifice, 7.0 cm.
Thickness of left ventricular wall, 1.4 cm.
Thickness of right ventricular wall, .3 cm.

Lungs: Right—This lung is found to be partly collapsed below Above there are some rather firm adhesions binding it to the chest wall. On pressure upon the lung, air bubbles are seen coming from behind and above. The pleura is greatly thickened and is covered with slimy yellow pus. A part of the compressed lung extends down as a flap along side of the pericardium. The lung is removed with difficulty. Almost in the angle formed by the parietal and visceral pleura, where the two surfaces are adherent posteriorly there is a small hole 2 mm. in diameter, which communicates with a cavity within the lung. On section the lung presents a peculiar appearance. A space of about two square inches at the apex is apparently free. Anteriorly below this there is a well walled-off cavity about 6 cm. long and 4 cm. wide in which there is some bloody fluid. This cavity is firmly walled off by fibrous tissue in places 2 cm. thick. Below this there is another oblong space with dirty dark green walls and containing fluid pus. Posteriorly and in the region of the middle and lower part of the upper lobe there is a large ragged soft wall cavity. From this cavity the perforation opens into the pleural cavity. The lapel of the lung which extends down along the side of the pericardium is entirely necrotic and filled with foul smelling material. The glands at the hilus are enlarged and of a yellowish gray color.

Left—This lung is adherent beneath the nipple region. The rest of the pleura is free. The lung on section is everywhere air-containing and is apparently normal.

Spleen: Shows some thickening of the capsule. It weighs 120 grams and measures 13 x 6.5 cm. Cut surface apparently normal.

Liver: Weighs 2140 grams and measures 34 x 19 x 8 cm. Cut surface is apparently normal. Bile duct is open.

Kidneys: The left shows a slight dullness of the cut surface. Both kidneys weigh together 385 grams and the cortex measures 7 mm. They are 14 x 8 x 3.5 cm. Right kidney is similar to left.

Adrenals: Apparently normal.

Gastro-Intestinal Tract: Stomach is normal. The intestines and appendix are apparently normal.

Pancreas: Weighs 60 grams and is apparently normal.

Pelvic Organs: Bladder and rectum are apparently normal.

ANATOMICAL DIAGNOSIS

Lung abscess on right.
Pulmonary hemorrhage.
Artificial pneumothorax.
Pulmonary gangrene.
Emphysema on left.
Parenchymatous nephritis.

Spontaneous pneumothorax with infection of pleural cavity.

BACTERIOLOGY:

No tubercle bacilli found. Many long rods and diplococci in pus from pleura and from gangrenous areas in lungs.

MICRO-PATHOLOGICAL DIAGNOSIS:

Lung: Sections of wall of abcess show a great amount of dense fibrous tissue in which there is some coal dust. Beneath this the air spaces are collapsed and in places lined with cuboidal cells. Another section shows air spaces filled with an exudate of large cells and fibrin. In one place there is a collection of pus cells with a dense fibrous wall around them. Another section of lung shows some of the air spaces and smaller bronchioles partly filled with blood. Some of the air sacs are greatly dilated. The capillaries are intensely congested. Some of the smaller bronchioles are filled with cells and fibrin but the lining cells are intact. Sections of lymph gland show some pigment. No tubercles.

J. S., Case 3. Colored male, 26 years old. Pvt. Med. Dept. Admitted September 20, 1918. Died April 20, 1919. Autopsy No. 51.

CLINICAL HISTORY:

Admitted to U. S. A. General Hospital No. 16 by transfer.

Family History: Father and mother dead, cause unknown; one sister died at age of 20 from tuberculosis.

Past History: Born in small town in the South but brought up in a small city in South. Had measles 1901; chills and fever 1905; hearing has been impaired eight or nine years—no discharge from ears.

Present Illness: Inducted into service September 22, 1917, sent to Camp Dix; drilled for four months when cough and expectoration came on gradually; sent to base hospital for one month; cough and expectoration continued; returned to duty for one week but taken off drill and given light duty; reported every day as an "out patient." Aug. 4 had sudden pain in right side which caused him to drop to the ground; was taken to hospital in ambulance. From that date to Sept. 7, 1918, was quite ill; since the latter date has been slowly improving. On admission has some cough, moderate expectoration and is dyspnoeic.

Physical Examination: Temperature 97° F.; pulse 104; respiration 22. Does not look well; well developed and nourished; broad deep chest; wide costal angle. Apex beat in sixth space 14 cm. to left of mid-sternal line. Right chest bulging; interspaces broadened; lagging with diminished expansion. Depressions above and below clavicle on left; tactile fremitus is absent on right. Percussion shows right isthmus narrowed, flatness from base to fourth rib and eighth dorsal spine and dulness above these land marks. On the left there is dulness from the fourth to the second

rib and diminished resonance from the second and third dorsal spine up. There are also absent breath sounds and vocal resonance from base to third rib and eighth dorsal spine on the right with coin test above these points; the sucussion splash is also elicited. On the left bronchovesicular breathing is present from the fourth rib and third dorsal spine up, also sub-crepitant rales from the fourth rib and third dorsal spine up.

Clinical Diagnosis: Tuberculosis, pulmonary, chronic, active both lobes left lung. Hydropneumothorax, right.

On admission the patient was positive for tubercle bacilli; negative for hook-worm and also the Wassermann. White corpuscles 8,640 differential count; small mononuclears 25 per cent; large mononuclears 3 per cent; transitionals 2 per cent.

Oct. 16, 1918. Up and about the ward, doing one hour bedside occupational therapy daily with no ill effects; coughs and raises but little.

Nov. 17, 1918. Patient has been more dyspnoeic for the past two days; considered dangerously ill. There is an increased amount of fluid in the right pleural sac.

Nov. 23, 1918. Coin test only heard above second rib and fourth dorsal spine 860 cc. thin, greenish, yellowish, purulent fluid removed from right pleura which was found to be sterile. Physical examinations from time to time show practically no change in the amount of fluid; patient gradually growing weaker.

Dec. 25, 1918. Profuse expectoration.

Jan. 11, 1919. Process in left has extended throughout greater part of the lung.

Jan. 29, 1919. Expectorating one and one-half box of sputum.

Feb. 27, 1919. Oedema of feet; systolic murmur discovered.

Mar. 15, 1919. Only 390 cc. of urine voided in 24 hours. Laboratory reports urine negative.

Apr. 2, 1919. Condition bad; general anasarca; dilated heart with pericardial effusion. All symptoms progressively worse. Probable length of pneumothorax eight months.

Radiographic Report:

First radiogram taken Oct. 7, 1918 (upright position): Left lung increased in density, of an irregular, mottled nature, extending throughout but more especially in the upper half.

Right lung shows a marked density from base to third rib, front, the density completely obscuring the heart and diaphragm outlines. The upper border is clean-cut and sharply demarcated from a marked transparency which extends from the third rib to the apex. A sharply demarcated horizontal line represents fluid line of level.

Diaphragm on the left low; at the seventh space.

Heart markedly displaced to the left, extending to beyond the midclavicular line.

There is a distinct difference in shape and size of the thorax on the right as compared to the left; the right is larger, the rib space wider and

the direction of the ribs are at almost right angles to the spine. There is also a distinct flare of the left lower thorax.

Lateral position shows fluid line of level to be perpendicular, or parallel to spine and to extend to within 1 cm. of vertebral border.

Diagnosis: Hydropneumothorax, right. Displaced heart. Pulmonary tuberculosis throughout left lung, moderately advanced.

Second radiogram taken Oct. 9, 1919 (upright position): Condition remains the same as at previous examination.

Prone position: Fluid is seen to cover the entire chest; causes greater displacement of heart and also of mediastinum.

Third radiogram taken Dec. 27, 1918: Shows definite increase in amount of fluid. Fluid line of level now extends to second rib. Displacement of heart about the same.

Fourth radiogram taken Jan. 15, 1919: Shows the amount of fluid possibly slightly greater. Heart possibly displaced to the left. Greater involvement of the left lung.

Fifth radiogram taken Mar. 4, 1919: Shows that the fluid has increased in amount. There is a less sharp fluid line of level. The heart is displaced more to the left and the left lung shows more congestion and greater tuberculous involvement. There is a greater difference than at previous examination in the shape of the thorax; on the right, the ribs are definitely at right angles to the spine, while on the left, the ribs descend obliquely.

Sixth radiogram (post mortem) taken Apr. 21, 1919: Whole *right* chest obscured by a marked density; there is no area of transparency. *Left* apex shows a more marked density and there are circular areas of transparency which suggest cavitation.

Heart displaced to left nearly touching outer thoracic border.

Diaphragm at the seventh space on the left.

Diagnosis: Pyopneumothorax on the right. Marked displacement of the heart and mediastinum. Probable fluid pericardium and probable cavitation upper third of left lung. Moderately advanced tuberculosis throughout left lung.

Autopsy:

Body: That of an adult Negro male. Length of body 179 cm. Pulse equal and dilated. The face, trunk, and legs show moderate amount of oedema. The abdomen is distended, rounded, navel prominent, fluid wave present. The genitalia are oedematous. Fingers show slight clubbing and curving of nails.

Thorax: The right side bulges slightly, the interspaces being full, while the interpaces on the left side are sunken in. Upon section the diaphragm is at the sixth rib on the right and the fifth rib on the left. The musculature of the chest is good. There is considerable fluid in the tissue.

The right pleural cavity is filled with purulent fluid amounting to 2500 cc. Upon removal of the fluid the lung is found completely collapsed, lying in the vertebral gutter. The apex is adherent, and the base is

adherent to the diaphragm by a band as large as a finger, attached to the dome of the right diaphragm. The pleura is everywhere thickened and covered with a shaggy grey exudate.

Lungs: The *right* lung is 18 x 3 x 4 cm. It is firm and black in color. On section the lung markings are completely obliterated. The tissue is dark red-black in color, firm and spleen-like in consistency. A fibrous band marks the interlobar septa. There is no macroscopic evidence of tubercles. The lung was firmly adherent to the mediastinum.

The *left* lung is voluminous and attached throughout the pleural cavity by adhesions easily broken up except at the apex where they are quite firm. There are delicate adhesions to the diaphragm. Upon removal there is found on the posterior surface of the lung, extending largely from apex to base, a jelly-like substance, yellowish white in color, which can be stripped with some difficulty from the pleura. It is intra pleural. Upon standing a short time the jelly-like condition disappears leaving only a heavy deposition of fibrin. The upper portion of the lung is firm and nodular. The rest of the lung is soft and crepitates. On section the upper third of the lung presents caseating tubercle formation. There is a firm walled cavity at the apex 5 x 5 cm. The rest of the lung is reddish pink and does not show macroscopic tubercles. The tracheobronchial glands are enormously enlarged, black, firm and dense. The largest is 4 x 3 cm.

Heart: The pericardial sac contains about 50 cc. of yellowish fluid. The heart is dilated and weighs 418 grams. The right auricle and ventricle are especially dilated. Upon opening the heart the tricuspid admits four fingers and the mitral three. The valves all appear normal, except for their dilatation. The ventricular walls are pale and thin. The measurements are as follows:

Tricuspid, 14 cm.
Mitral, 11 cm.
Pulmonic, 8 cm.
Aortic, 7 cm.
Right ventricle, 5 cm. thick
Left ventricle, 12 cm. thick

The aorta, around the coronary openings and above, shows numerous atheromatous plaques. The aorta is not dilated and has not lost its elasticity.

Abdomen: The cavity contains 2500 cc. of yellowish slightly turbid fluid. The peritoneum, except around the liver and spleen, is clear and glistening. The omentum is apparently normal. The mesenteric glands are not enlarged.

Liver: The liver is down a hand's breadth below the costal border. It is covered by a white smooth fibrin deposit and there are moderately dense adhesions to the diaphragm. The surface of the liver is mottled; it feels somewhat nodular. On section the capsule is thickened. The markings are pale with areas of deep injection.

Spleen: The spleen is small, firm and "brittle." There are numerous

adhesions to the peritoneum. It cuts with some difficulty. The capsule is thickened and the splenic tissue dark red, firm, slightly granular.

Kidneys: Both kidneys are slightly enlarged. The markings are clear but the general color is dark red. The capsule strips easily.

Pancreas: Apparently normal.

Adrenals: Normal in size but firm and "brittle."

Stomach and Intestines: The rugae are everywhere prominent and injected. No ulcerations along the intestinal tract.

Anatomical Diagnosis

Pneumothorax right chest.
Collapse of right lung.
Tuberculosis, fibro-caseous, with cavitation left lung.
Cardiac dilatation chronic with mitral and tricuspid insufficiency.
Perihepatitis.
Perisplenitis.
Chronic passive congestion of liver, spleen, kidneys.
Ascites.
Oedema of face, trunk, genitalia and lower limbs.

Bacteriology:

Heart blood, sterile. Right pleural fluid, sterile.

SUMMARY

The first case presented showed a remarkable degree of displacement of heart and mediastinum, the radiograms demonstrated this clearly. It is well to call attention, therefore, to the great movability of the mediastinum. In the same case there should be noted the unusual degree of downward displacement of the diaphragm as the radiogram shows the twelfth rib clearly. This again demonstrated the pressure force of the pneumothorax and the easily displaced diaphragm, its muscular tone probably totally lost. The pressure of the pneumothorax is also demonstrated by the extreme degree of lung collapse.

In the second case, the use of air or gas for producing a pneumothorax should be carefully considered. This has, of course, been brought out a great many times by other writers, but this case furnishes an excellent example of the failure of artificial pneumothorax under certain conditions. The occurrence of a superimposed spontaneous pneumothorax is best indicated by the temperature, pulse and respiration chart. At this point we should not lose sight of the danger of this serious complication and the importance of more carefully considering changes occurring in the temperature, pulse and respiration. In the first place this case proved to be non-tuberculous, although positive on admission, eleven negative sputum examinations followed. Greater attention should have been paid to the sputum findings. The pneumothorax was performed with the sole purpose of stopping hemorrhage. The radiographic report questioned the case as being tuberculous. Greater care undoubtedly should be made in the selection of cases for induced pneumothorax

and radiograms should be taken and the reports carefully considered. Physical findings are not sufficient.

In the third case, the position and degree of lung collapse is unusual as the base is conical with the apex attached to the dome of the diaphragm. In spite of this adhesion the liver was dislocated downward 8 cm. The movability of the mediastinum is again demonstrated.

In preparing and obtaining data for this contribution, I wish especially to express my appreciation for the aid given by Lieutenant Colonel Estes Nichols, Commanding Officer, Maj. H. J. Corper of the pathological laboratory and Maj. James A. Honeij and Lieut. I. E. Liss of the roentgenological laboratory. I desire also to thank the Yale Medical School for work done in its pathological and roentgenological laboratories.

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ODDS AND ENDS IN ARTIFICIAL PNEUMOTHORAX

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I would feel much hesitancy in speaking on what might be called an old subject in the field of tuberculosis therapy if it were not for the fact that pneumothorax workers themselves are not all agreed, and many physicians treating tuberculosis openly condemn the method as a therapeutic measure. For that reason it seems fitting to gather what I am pleased to call odds and ends in the work into some semblance of order and present them for what they are worth.

Say what you will, artificial pneumothorax in the treatment of tuberculosis has come to stay. Look backward over all the specifics and near specifics handed on silver platters to a credulous profession and already we find they have grown musty with disuse or are buried deep in all but forgotten graves.

This, however, cannot be said of lung compression. Tried at almost the beginning of the nineteenth century and spasmodically thereafter until put upon a sound footing by Forlanini, it has now become a matter of routine in suitable cases in many institutions throughout the world. True, time has taught us much of the things that we ought to know and to-day we look upon our earlier attempts as upon a nightmare which we could but wish were blotted from the memory.

Following at first the teaching of rapid compression it took many of us some time to learn the evils incident thereto. And I may add that many still cling to the earlier teaching and are inflicting great harm by turning deaf ears to what so many of us have learned by bitter experience. To give more than 500 cc. as an initial dose is unnecessary. By repeated fillings at short intervals in the beginning one can produce a perfect compression with small amounts of gas. The only possible excuse for large amounts is in the treatment of hemorrhage and here of course as rapid a compression as is consistent is the end sought. Rapid compression in the routine case by the injection of large amounts of air squeezes toxins into the lymphatic circulation with resultant high fever, pushes over the mediastinum thus partially compressing the opposite lung, tears adhesions which may leave a rent in the pulmonary tissue resulting in a natural pneumothorax and then ending in an empyema. In fact most of the so-called complications can be traced directly or indirectly to the injection of large amounts of air, thereby causing a too rapid compression.

Another important point and one that is often overlooked is, once the compression is established, the necessity of keeping it complete.

Seldom have I been able to allow the interval to exceed two weeks during the first year and in no instance have I been able to exceed one month at any later period. True we see many patients who go from three to four months without a filling but with what results?

The same criticism can be made of partial compression advocated by some writers. I mention this procedure merely to condemn its use. Unless complete immobilization is maintained the end results will be disappointing. The whole framework upon which the theory of compression is based falls to earth if partial compression is of value. The only excuse for partial compression is for the relief of symptoms in an otherwise hopeless case. Many times I feel that this is justifiable since many disagreeable symptoms are lessened and the mental attitude of the dying consumptive is markedly improved.

Here let me digress long enough to say that the value of mental suggestion in artificial pneumothorax must not be underestimated. The very fact that a physician can say to a patient, "I have something that offers tangible results in a certain percentage of cases," immediately implants in the mind of that individual the hope of cure. Let me cite as an example a case reported by me in a serial article appearing in the *New York Medical Journal* (Mar. 29, 1919). This patient had been in the sanatorium one year under the usual routine of sanatorium life. At the end of that period she left the institution and her condition was unchanged. Her pulmonary status showed a very large involvement of the left lung with some fibrosis of the right upper. Two years after she returned much better in every way. She stated that up to nine months before she had done poorly having had hemorrhages and low grade fever. Pneumothorax was performed by her physician with excellent results. She wanted to continue the treatment. The doctor to whom she was referred tried to introduce gas but was unsuccessful. A hemorrhage occurred on the table. Radiographs taken after this attempt showed absolutely no compression. The same patient later consulted me and the findings were verified. This patient may possibly have had a small pocket of gas at one time but never even a partial compression and the air had been introduced into the lung and out the mouth. Yet the psychological effect was wonderful. The patient was without question better than at any time since she was known to me and all due to the fact that she thought she was getting a treatment that offered hopes of cure.

Success in the field of artificial pneumothorax depends upon the proper selection of cases. There is no one treatment in tuberculosis that requires greater care and judgment in such selection than does lung compression. And here let me state that the physician's attitude toward this method will depend upon his judgment in such selection. Some men condemn compression blindly. They have seen the failures and formed their conclusions from observation rather than from personal experience. They will have none of it. Others have undertaken the work in an unscientific manner because their patients wanted gas, or because their enthusiasm had been fired by the symptomatic results at first reported.

They showed no judgment in their selection of cases and the outcome was disastrous. They quit the treatment and cursed it, forgetting that their failure lay not in the method but in the judgment of the doctor himself.

Then there is the second class, the man who acts wisely and tempers that wisdom with good judgment. It is to him we owe the placing of artificial pneumothorax on a sound and scientific footing.

Briefly stated cases for compression can be grouped under the following heads: 1. The typical gas case, the unilateral. 2. Bilateral cases with not too much active involvement on the opposite side. 3. Extensive trouble on the opposite side with hopeless outlook and in which the lesser offender is compressed to relieve symptoms. 4. Compression for hemorrhage. To make the indications more general one might say that all cases are suitable for attempted compression that have been under observation for some time and seem at a standstill. This presupposes of course that the opposite lung offers reasonable chances of doing the increased work. Otherwise the case would not be one for gas consideration. I shall not attempt to discuss in detail the different classifications. They are too well known to all of you. However, I shall take up a number of cases that I feel should be of interest since they are not what one would consider typical gas risks.

Plate 1. This man had been a patient at Saranac Lake for some months and getting no results had decided to try the Southwest. He was placed in the Methodist Sanatorium for a period of seven months. The right lung was completely involved with a general fibrosis of the upper lobe and an active infiltration of the middle and lower. Over the left could be heard scattered rales, although the breathing seemed normal. His fever ran a daily maximum of 100, sometimes going to 102. The left side never cleared up and I was afraid to produce a compression of the right. At last he was moved to St. Joseph's where the radiograph showed a perfect lung on the left. I at once produced a compression and the rales on the left immediately disappeared. They were no doubt transmitted although I could never satisfy myself that this was actually the fact. Besides showing the possibility of transmitted sounds it also shows the undoubted value of a radiograph in connection with one's physical examination.

Plate 2. This shows the same patient many months later after the formation of fluid. The exudate kept up the compression perfectly with but occasional fillings of gas. He later contracted influenza, had a typical broncho-pneumonia in the left base which apparently spread his tuberculosis through this area. At present his condition is fairly good and he has returned east expecting to keep up his compression. If the opposite lung becomes quiescent I still think his ultimate chances for recovery good.

Plate 3. This shows an ideal gas case from the standpoint of the opposite lung. It is unquestionably a unilateral case. The physical examination showed an active involvement of the entire right lung. The left was perfectly normal. These findings were confirmed by the radiograph. However this patient had been ill for two years, had gone

from one health resort to another gradually growing weaker and always running high fever. When I first saw her the physical appearance was that of far-advanced tuberculosis with temperature of 103 daily. Pneumothorax was advised as a last resort, a complete compression obtained but without success. The patient continued to grow weaker from day to day and at the end of four months died. Here without doubt an excellent result might have been accomplished had the attempt been made before the patient had been so weakened by disease.

Plate 4. This patient was kept under observation for five months since the amount of trouble in the opposite lung was too great even to consider pneumothorax. During this time she continued to lose ground and at last gas was advised as a possible means of saving what otherwise appeared to be a hopeless case. As can be seen from the radiograph the compression was only partial, but the patient was decidedly benefited. Her temperature came to normal, sputum was decreased 50 per cent., and in six months she was able to nurse an invalid sister. The sister having died she returned to Detroit, Michigan, and during the last six months has been living in that climate where she still continues the treatment.

Plate 5. This radiograph shows a case with dense fibrosis and an active infiltration extending from the hilus downward into the left base. The patient had been confined to his bed for one year running a low grade fever and having persistent venous hemorrhages.

Plate 6. This shows the same lung after attempted pneumothorax. The active area is perfectly compressed but in no way has the dense fibrosis been affected. The result was a loss of fever and a cessation of the bleeding, and now at the end of a year the patient is able to be around, enjoy auto rides and without doubt has had his life prolonged and has been made much more comfortable.

Plate 7. This is shown to illustrate further the difficulty of compressing fibroid areas. In the upper lobe of the right lung a cavity appears which it was impossible to collapse although the remainder of the lung is well compressed.

Plate 8. This radiograph is that of a nurse who is still continuing the treatment and who was first seen three years ago. The right lung showed dense fibrosis upper lobe with cavity formation, numerous moist rales over entire area and an infiltration of the middle lobe which was very active; left upper to third rib anterior and to hilus posterior showed a moderate amount of activity. She was placed under observation for a few months to no effect. Pneumothorax was then advised and a good compression obtained. The temperature became normal after three months and remained so until the formation of fluid at the end of a year. The fever as a result of the fluid did not run high and in a short time was normal again. She has had recurrent fluid formation with slight rise of fever, but never enough to be an inconvenience long at a time. She has been doing nursing for over a year and the noncompressed lung although not entirely well is much better. In this case I feel the compression should be kept up indefinitely inasmuch as the fillings are a month apart.

And further I know she can work under the present conditions, while I am not sure what might happen if we let the compression go.

Plate 9. This patient was compressed because of repeated hemorrhages from the left lung. He had been under observation for one year, the right lung showing an active infiltration of the upper lobe to the third rib. During this time he was not free from bleeding over intervals longer than a month. The temperature averaged 100 daily maximum. A compression was advised because of the bleeding and although it is only partial the result was excellent. He has had gas for nine months with no recurrence of the hemorrhages, his temperature runs normal and the opposite lung has become quiescent.

Plate 10. This is shown as an example of a nearly perfect compression. Seldom does one see a lung tied in a kidney shaped mass around the hilus, but more often as shown here lying along the spine. The results in such cases are excellent.

Plate 11. This patient had been in New Mexico a year and had then gone to Denver for another twelve months. There he attempted to practice law but without success from the standpoint of health. Hemorrhage followed hemorrhage at short intervals. He came to Albuquerque, was placed in bed and kept under observation for seven months. Still the hemorrhages continued. I hesitated to compress the bleeding lung because of the active trouble on the opposite side. However, it came to the point where either success must be obtained by pneumothorax or failure by the routine methods. A compression was successfully performed. That was three and a half years ago and the patient has been working during the past year. The active process in the opposite lung is now quiescent and is clearly seen in the radiograph. At one time during treatment he had an attack of typhoid running a temperature as high as 105. It was six weeks before the curve became normal and at no time did the pulmonary condition light up. Fluid formed in this case and it is interesting to note the peculiar pocket left after absorption beginning in the base.

Plate 12. This radiograph shows the lung held in position by the fluid and one can see the beginning absorption in the base. The preceding plate, number eleven, showed fluid at one time extending to the base, and no doubt the peculiar pocket was the result of basal absorption and the formation of adhesions later which held the fluid in its present position.

Plate 13. This shows an anterior-posterior compression which kept the patient free from hemorrhages and held the temperature to 99.2 for months and no doubt would have ultimately produced a good result had he not died of a hemorrhage from the opposite lung. I have had four cases compressed for hemorrhage in which the patient died later from such a complication. In two of these the bleeding came from the opposite lung and in two the death was due to a broncho-pneumonia following aspiration of blood.

Plate 14. This radiograph shows a chest five years after discharge. The patient had been in the sanatorium for six months with a rapidly

progressive lesion and with only a small scar on the opposite side. Typhoid developed during the routine treatment and ran the usual course. At the end of this came a natural pneumothorax which apparently healed. Then pleurisy with effusion developed and on two alternate days seven quarts were removed in order to relieve pressure symptoms. Air was introduced and the lung compression thus maintained. The artificial pneumothorax was continued 18 months when the patient was discharged. That was five years ago and to-day he is in perfect health. For the past three years he has been driving a taxi and is thus exposed to all conditions of weather and late hours. As can be seen from the radiograph there is a marked fibrosis in the right upper with good breathable tissue from there to the base.

Before closing I feel that I must refer to the necessity of asepsis in pneumothorax as being of as much importance as asepsis in other fields of surgery. This may be deemed by most of you as an unnecessary warning, but I have seen many operators who washed their hands in cold water, walked up to the patient, took instruments from a pan in which they had been carelessly boiled, handled the needle carelessly after trying to operate the pet cocks on the machine, waved a pledget of cotton, with a suspicion of iodine on it, at the patient's side, jammed the needle through skin and subcutaneous tissues, shot a few hundred cc. of gas into the chest, pulled out the needle, pinched the hole together and let the unfortunate patient go on his way rejoicing.

As I stated in the beginning this paper is one of odds and ends gathered over a number of years of work and does not attempt to treat the subject of lung compression, but rather to throw out sidelights on what to me is the most interesting subject in the field of tuberculosis therapy.

DISCUSSION ON PAPERS BY MAJOR DUNHAM, CAPTAIN MORRIS AND DR. PETERS

Dr. Ethan A. Gray, Chicago: A careful study of the papers presented, from time to time, on the subject of artificial pneumothorax, together with a consideration of the problems and complications which confront us in this work, tend to confirm my opinion that the sooner we induce a collapse of the lung in the tuberculous individual, the better.

I am aware that this statement is radical, as compared with the views and practice of the conservative element, but I may, perhaps, point out one thing, that the delay of a year or a year and a half makes the patient a definitely far advanced case. The lung is, to a great extent, lost and the patient has become cachectic. I prefer to sacrifice, rather than to lose, the lung, if I can avoid the cachexia.

The matter of pneumothorax appearing above and below, as noted by Major Dunham, appears to me to have some connection with the multilocular abscesses so often seen in the empyemas of influenzal origin. Regarding spontaneous pneumothoraces, there is no doubt that they are often produced by the tearing of adhesions. We thought formerly,

that they were chiefly caused by ulceration. A violent cough in an otherwise normal individual who has a slight adhesion, may produce a spontaneous pneumothorax; it may be produced in the presence of artificial pneumothorax in the same manner, whether we use, as Dr. Peters said, a large amount or a small amount of gas with each insufflation. I have never seen an apparatus which could produce, of itself, a spontaneous pneumothorax.

Dr. Maurice Fishberg, New York: I have been very much interested in the three papers presented here to-day. Practically all the aspects of pneumothorax have been discussed. Major Dunham spoke of the radiographic aspects of localized pneumothorax, while the others discussed spontaneous and artificial pneumothorax. It so happens that about four years ago I made a special study of the localized forms of pneumothorax occurring quite frequently among tuberculous patients, in fact more frequently than it is recognized. These lesions are very frequently identified erroneously as large cavities in the lungs. By carefully studying my material in the tuberculosis wards of the Montefiore Hospital I found eleven cases of localized pneumothorax among 135 patients. In fact, I have a few cases nearly always under my care at the hospital, and in my private practice I meet with them very often.

I am glad to hear from Major Dunham that the x-rays are not invariably decisive in these cases. In a paper which I published some three years ago, I reproduced radiograms of two cases which indicated localized pneumothorax, but physical examination and symptomatology pointed to large cavities. The autopsies confirmed the clinical findings.

In my experience physical exploration of the chest is more reliable than radiography when an attempt is made to differentiate large pulmonary cavities from localized pneumothorax. In both conditions auscultation may reveal amphoric breath sounds, but in cavities there are, as a rule, also rales, large, moist, consonating or "cavernous" rales, while in localized pneumothorax, rales are never heard. The so-called "dry cavities," mostly found in fibroid phthisis, are not accompanied by severe constitutional symptoms. When finding signs of large cavities, without rales, and with severe constitutional symptoms, think of localized pneumothorax. It seems also that when the whispered voice is transmitted loudly in the axilla, we usually, though not invariably, deal with a localized pneumothorax. A history of a sudden onset of acute symptoms with pain, dyspnea, etc., which soon subsided, also points to pneumothorax. Large cavities form slowly, while localized pneumothorax appears suddenly.

Of spontaneous pneumothorax, rupture of the lung in an apparently healthy individual, I have met with six cases during the past eight or nine years. One man suddenly went into collapse without any visible cause, with pain in the chest, and abdomen, severe dyspnea, orthopnea, cyanosis, etc. He was taken to a hospital and a diagnosis of a perforating gastric ulcer was made. He refused to submit to an operation, and was removed to his home, where I saw him 24 hours after the onset. Signs of collapse of the lung were easily found. Within four or five weeks

the air in the pleural cavity was absorbed, and he has been feeling well now for over seven years.

I have seen five other cases of this kind. There is no doubt that most of these cases are due to tuberculous lesions in the lung. The lesion is located under the visceral pleura, is small in extent, and when rupturing allows air to enter the pleural cavity and collapse the lung. This very collapse is apparently instrumental in healing the slight tuberculous lesion in the lung. There appears to be evidence in favor of the view that some of these cases are not tuberculous in origin. But one thing is certain, the prognosis is very good. Most recover and keep well indefinitely. One of my patients developed phthisis three years after the accident.

Permit me to make a few remarks about the suggestion of Dr. Peters that when inducing an artificial pneumothorax the lung should not be collapsed completely, and that a partial pneumothorax is sufficient. It is my opinion that in such cases it is mainly the psychic effect which exerts therapeutic influence. I have repeatedly attempted to induce pneumothorax and failed to procure collapse of the lung because of pleural adhesions, and finally gave it up as not feasible. But it was remarkable that there was immediately noted an improvement in the constitutional symptoms, the fever declined, the appetite improved, etc. It seems that the anxious patient, feeling that something has been done for him or her, takes a more hopeful outlook, and the optimism has been instrumental in ameliorating his condition.

This is the only way we can explain the salutary effects of a partial pneumothorax. But here we run the risk of rupture of the lung, when during fits of cough there occurs tugging upon adhesions. I have seen several cases of this type. Dr. Krause has reported such cases several months ago. In fact I am under the impression that in many cases pyothorax following artificial pneumothorax is due to rupture of the lung the result of rents produced in the lung during fits of cough when adhesions pull upon the visceral pleura and lacerate it. Without rupture of the lung pyopneumothorax is rare; sterile effusions do not become septic unless infected from without, during exploratory puncture.

On the whole it appears that artificial pneumothorax is but a palliative measure, and suitable for a very few cases of phthisis. In the vast majority of cases adhesions prevent complete collapse of the lung; in many, complications, such as effusions into the pleura, prevent a successful outcome. Indeed hardly five per cent. of cases are suitable for this method of treatment, and of these but few get well ultimately.

Just one more word before closing. It appears that after remaining collapsed for months, the lung, when allowed to reëxpand, functions again in an excellent manner. I have seen this clearly demonstrated in cases in which I collapsed a lung and the patient got well. But later on a new focus appeared in the other previously unaffected lung. A pneumothorax was then induced in the second lung. The patient had then to breathe with the lung that was treated before, and has now reëxpanded.

Maj. H. Kennon Dunham, Oteen, N. C.: I rise to a point of inquiry.

I hate to prolong these proceedings, but "the queerest things I hear are things they say I said." I would like the Doctor to say plainly, so I can get it, what he thought I said about the diagnosis of cavity by means of the x-ray. Also, before he stops, I would like to know what proof he has of those localized pneumothoraces which he reports made from physical examination.

Dr. Fishberg, New York: Localized pneumothorax is a condition in which air enters the pleural cavity through a loss in continuity in the visceral pleura; but complete collapse of the lung does not result because of pleural adhesions. An air pouch is thus formed occupying a small space of the pleural cavity. If tuberculous processes in the lung and pleura would not produce adhesions, over 90 per cent. of tuberculous patients would develop pneumothorax. But as a matter of fact statistics compiled by various authors show that about two per cent. only develop this complication; some found as high as five per cent. The reason is clear—pleural adhesions prevent the development of pneumothorax; and when rupture does occur, it is only a small area of the pleural cavity that can fill up with air.

Localized pneumothorax may occur in any part of the pleural cavity; some are observed in the interlobar fissures. These are not easily diagnosticated. Radiography is of great assistance in clearing up these conditions, and I would not attempt to make a diagnosis without the aid of x-ray plates, but in many cases physical signs, when carefully elicited and interpreted in connection with the history and symptomatology, are much more reliable than radiography alone. In his paper, Major Dunham stated, as I understood him, that while the x-ray plate showed a localized pneumothorax collapsing the upper lobe of the right lung, yet the autopsy showed a large cavity. I have had such cases repeatedly at the Montefiore Hospital. In this institution, because of experiences of this kind, our radiographer will not make a diagnosis without correlating his findings with the clinical facts, and at times, not until the autopsy report has reached him.

Maj. Walter H. Watterson, Chicago: Since three of the superintendents of the principal hospitals throughout the country have had this particular case under their observation, and several physicians who have visited the Municipal Sanitarium in Chicago have personally seen this case and examined it, I wish to report it. About seven years ago Theodore B. Sachs did pneumothorax in this case. We will represent the case as "H. G." The case frequently had hemorrhage. We took a plate of the case in September, 1916, which showed her entire left lung collapsed with the exception of the apex above the second rib, and there was a gradual sloping of the shadow from the hilus toward the clavicle. Within the uncollapsed area we found three cavities. In September, 1917, just one year later, after continued treatment for one year, another plate was taken. A careful study of this plate showed that the three cavities had been collapsed. Now, we had simply bands where the cavities were formerly present. At last the pneumothorax had wended its way back. We now have simply a band remaining, as evidence of the

old walls of the cavity. At the attachment of the lower band to the hilus was a lighter shadow area than of these bands. I especially reported this because Major Dunham and one of the other men here discussed the matter of the fluoroscope in connection with the study of the plates. We could not tell where this hemorrhage came from. Still the hemorrhage continued all this time. It had been a hemorrhage case for nearly five years. About every three or four weeks there would be a hemorrhage; not severe, but so much so that we thought we must keep the case under careful observation and not allow the young lady to work. As to pressure used at this time, and as to the point that Captain Morris, I believe, brought out that the mediastinum is easily movable,—the pressure at this time was plus 2. We found that the mediastinum did not, however, change its position from normal. The plates were not taken prior to September, 1917. After carefully studying the two plates we decided to fluoroscope it and watch it carefully. We found that this little triangle where the band connected with the hilus about two fingers width was *motile*. We decided that the hemorrhage was coming from that area. We increased the pressure from plus 2 to plus 8 before taking another plate of the case. This third plate showed the triangle had disappeared, and had become part of the band. The hemorrhage ceased and has not reoccurred, as Dr. J. W. Coon, Stevens Point, Wis., just reported to me, the case having gone to him. She has been with him for about a year and a half now and she is weighing 140 pounds. When I asked the Doctor a few minutes ago whether she was still alive he said that she was *very much alive*. The case, seven years under careful study, teaches, first, that the fluoroscope is of most value for one thing, and that is to study motility; second, that mediastinum is not easily mobile in long treated cases, third, that great pressure is necessary to accomplish the end sought in some pneumothorax cases.

Dr. C. O. Probst, Columbus, O.: I just want to refer to what Dr. Peters had to say of the psychological effects of this operation. I want to mention the case of a patient, a young woman in bed with advanced tuberculosis. She was unable to come to the office for an x-ray picture, so we had to do the operation without that advantage. This was one of my earlier cases, and I thought I was getting the gas into the pleural cavity freely. My suspicions, however, were aroused. I introduced a pledget of cotton soaked in camphor into the glass tube, and I found that my gas was going out by the mouth. The patient, however, made a remarkable improvement in every respect. From a bed case she got to be able to be around-the house, was eating much better, the fever was less, and in every way she was improving. But I was charging her husband for my time in going down to introduce the gas, and getting no collapse. I had to weigh the ethics of the case. I am sorry now I did. That is the reason I bring up the point. Finally I called in the husband and explained the case very frankly to him and asked him what I should do. I suppose he weighed the financial expenditure and decided that I ought to tell his wife. I shall never forget that interview. I felt as though I had taken a plank away from somebody that was swim-

ming at sea. She very promptly died after the treatment was stopped.

I wonder whether we might not be justified, where we do see the psychological improvement and are unable to get any collapse, finding no cavity, whether we would be justified in continuing the operation?

Dr. Alfred Meyer, New York: Some of you may remember that Dr. King of Liberty reported very frankly, with a good deal of courage, I think, his first experience with artificial pneumothorax at Liberty. That was an experience similar to what has just been reported by Dr. Probst. He reported that he had used 2000 cc. of this nitrogen gas, and it was not so easily obtainable then as it is to-day, as I can say from personal experience. He wasted 2000 cc. of nitrogen gas and found out that the gas had been escaping through the bronchial tree into the universe. In other words, he was trying to compress the lungs, but as a matter of fact, the gas was escaping into the outer atmosphere. I have found, in cases like the one that has just been reported, that in deciding whether you were in the pleural cavity or in connection with the bronchial tree, what has worked in almost every single case has been the faithful use of the manometer as a guide. I have tried menthol and camphor and other things but they do not work well. I should insist in every case that every man who does this work should feel his responsibility sufficiently to use the manometer as a guide. Just one other word on the question of artificial pneumothorax. I feel that men especially who are doing radiological work should coöperate with the clinicians in determining the question of the dislocation of the mediastinum, and the age at which by preference it occurs. Regarding this age, there is a great deal of difference of opinion and confusion. My own experience has been that this dislocation occurs with special frequency in the young. One of the papers spoke of young people up to forty. Now, I am sixty-five and forty to me of course appears young, but my recollection is that at the age of forty you do not get the dislocation of the mediastinum as in individuals of twenty or eighteen.

One of my assistants who is in the audience has recently reported a very remarkable dislocation of the upper part of the mediastinum in young people in artificial pneumothorax. In other words, the artificial pneumothorax extended over from the left side, beyond the median line into the right side, and the physical signs of pneumothorax and the radiograph corroborated each other away through into the other half of the chest. In addition, as I have seen lately, I have had under observation when I left town a young man of seventeen with right spontaneous pneumothorax extending to the other side. In other words a right spontaneous pneumothorax in which the mediastinum in its upper and lower parts was dislocated half way to the opposite nipple line, in other words his right pleura extended into the left chest. I want to ask a question; Does this dislocation occur in people of 20 or under, or in people of forty and over? I think that is the point.

Dr. George Mannheimer, New York: Pneumothorax occurs much more frequently than is generally believed during removal of fluid from

the pleural cavity, especially when a sharp needle is left for any length of time in the cavity and coughing has not been prevented by the previous administration of morphin. Such a pneumothorax is usually harmless and disappears in a short time. Without the x-ray we would frequently overlook it. Pneumothorax has also been known to occur after simple exploratory puncture.

A case has been mentioned in the discussion of spontaneous pneumothorax which had come under the hands of the surgeon for a supposed intra-abdominal perforation. We are all familiar with the fact that a right-sided pneumonia or pleurisy can simulate an acute appendicitis or cholecystitis. But it is not generally realized that the sudden occurrence of a perforation of the lung with escape of air into the pleural cavity is a powerful traumatism to the serous membrane and can excite strong abdominal reflexes. Small wonder that thereby the picture of the "acute abdomen" is produced. It is up to us to draw attention to these cases and save them from surgery.

Dr. C. D. Parfitt, Gravenhurst, Canada: Of many interesting points brought out in the several papers this morning none is more important than that of the degree of pressure to be used for an individual case throughout the treatment by artificial pneumothorax. As Dr. Peters has suggested, the pressure must be adjusted to the peculiarities of the patient, and my own experience shows that the maintenance of an optimum pressure is of far greater importance than the attempt to realize any ideal of complete compression. This optimum pressure may vary in the same individual with the possible changing conditions of the mediastinum. A fair realization of the condition and displacement of the mediastinum is essential to pneumothorax therapy. I was glad to hear the several references to the mediastinum in the papers and discussions as hitherto it has been but little dwelt upon in the pneumothorax literature, and, I have reason to think, has been too little taken into consideration in practice. If one has easy facilities for the use of a fluoroscope before and after refills the degree of displacement may be readily observed, but, when such an aid is not at hand, careful observation of the manometer permits deductions regarding the mobility or rigidity of the mediastinum which are reliable when either condition is at all marked.

Dr. Crombie and I have found that a flexible mediastinum is shown by a slow rise in pressure, a relatively small amplitude of movement of the fluid in the manometer, with sluggish movement, and certain relatively stationary points at which there is no material rise in pressure after one or two consecutive decilitres of gas have been introduced. Rigidity is shown by the converse of these several points. The accuracy of the deductions has been frequently verified by the fluoroscope. A small bore needle, or a means of reducing the manometric fluctuations if one of large bore is used, are essential for making these observations. V. Muralt in 1911, and later Hamman and Sloan suggested manometric observation as a means of estimating the condition of the mediastinum, but their views regarding the indications were at variance with one another and with those mentioned.

Relative to the adjustment of pressures are the weak spots described by Nitsch. An excellent example of the lower weak spot which lies between the aorta and the oesophagus between the fifth and twelfth vertebrae is shown in one of the slides of spontaneous pneumothorax exhibited by Captain Morris this morning. In the paper referred to by Dr. Meyer, which appeared in May in the *Journal of the American Medical Association*, there is an illustration of the over-distension of the other weak spot at the site of the atrophied thymus. Frequent x-ray observations or else a close attention to the manometer should make undue displacement of the mediastinum and over-distension of these weak areas unlikely.

Dr. F. M. Pottenger, Monrovia, Calif.: The shifting of the mediastinum is a very important factor in tuberculosis and I am surprised that clinical men have not given more attention to it. I would go a little further than Dr. Parfitt and say that whether a patient with advanced tuberculosis will do well or not depends considerably on the ease with which the mediastinum shifts. If the pericardium is large and permits the heart to shift readily. compensation takes place with greater ease and the patient, according to my observation, makes better progress.

I have found spontaneous pneumothorax very common in my advanced cases of tuberculosis. The degree of incidence has varied at different times according to the material in the institution. I have found as high as 10 and 12 per cent. of pneumothorax cases in a given year. In other years I have not had more than two or three. The temperature and pulse offer a very important diagnostic point in the diagnosis of spontaneous pneumothorax, but is of value only in those patients where the pulse and temperature curves are charted regularly. The point that I refer to is that when spontaneous pneumothorax takes place both temperature and pulse take a sharp rise. Sometimes a temperature which has been 99 or 100 prior to the pneumothorax will go up to 102 or 103. The entire rise may take place within two or three hours. In other instances where the pleura fills more slowly it may take a couple of days before the full height has been obtained. When one finds this picture he is justified in suspecting pneumothorax and will not often be disappointed. The other symptoms which take place depend very much upon the side on which the pneumothorax takes place. If it takes place on the side on which there is marked necrosis and ulceration and succeeds in producing compression of the lung it will have a tendency to lessen the amount of secretion. If it occurs on the opposite side it may increase the secretion. The shifting of the mediastinum is a very important thing in pneumothorax. Spontaneous pneumothorax, in my experience, has occurred most frequently on the side which was most severely affected. As a rule in these cases prior to the occurrence of the pneumothorax there is some shifting of the diaphragm toward the side of most serious involvement. If the pneumothorax occurs on this side and is at all extensive it will force the mediastinum back to the center or to the other side. Consequently we often find as a sign of pneumothorax a shifting of the heart away from the side which is known to be most

seriously involved. In reading the older writers on the subject of pneumothorax it was usually stated that the temperature dropped. I have seen this in a few instances, but in nearly all it was in patients who had a pneumothorax on the side which had practically no lung involvement and the patient had suffered considerable shock as a result of the collapse. In my advanced tuberculous cases I have only seen a drop of temperature in two or three instances. My experience in spontaneous pneumothorax, as far as mortality is concerned, is very different from that which has been usually described in literature. It proves fatal in a very small percentage of cases, and in the average patient seems to do no harm.

Dr. A. G. Shortle, Albuquerque, N. M.: I am now in my eighth year of my use of artificial pneumothorax and have used the procedure in over 350 cases, so naturally I have arrived at some positive conclusions regarding the technique.

Dr. Peters has touched on one point that I merely want to emphasize, that is the importance of the small dose. I am constantly having patients come to me from the East who have been under this treatment and who have been receiving doses of 700, 800 and even 1000 cc. Now to my mind such dosage is sufficient explanation for failure to get results in any case. In my practice practically 80 per cent. of the cases coming to me are third stage. This, of course, means that they are practically all bilateral. Now, if, in starting collapse in a bilateral case, I use the large dose mentioned I am almost certain to activate the working lung. On the other hand, by administering only 250 to 350 cc. at a time, taking, say, a month to bring about complete collapse, and administering the dosage frequently, I am often able to get good results in a patient with rather extensive trouble in the working lung. It is not uncommon for me to start collapse where the working lung will show activity as low as the third rib, and sometimes even more than that. This, of course, means frequent dosage.

At the Albuquerque Sanatorium we give gas each Monday, Wednesday, and Saturday, also at our downtown office, often having as many as 15 patients in a morning. The matter of pressure naturally follows that of dosage. I think a simple rule to be given for the proper pressure is to use the smallest pressure that will give you the symptomatic results desired, I do not care what that is. In patients with a flaccid, unstable mediastinum I have obtained good results with a pressure as low as a negative three or four.

I would like to say just one word about the treatment of spontaneous pneumothorax. It is usually considered that nothing is to be done but to watch events. For some years I have followed the plan of introducing a needle attached to the manometer, watching the pressure in these spontaneous cases, reducing the pressure when it seems too great and increasing it when the lung shows signs of reëxpansion. I do this under the theory that a partial healing of the opening takes place and when the air has been absorbed sufficiently for the lung to reëxpand the partially healed opening is ruptured and we again have spontaneous pneumothorax. While if the pressure is kept up to, say, a neutral, the lung is not allowed

to reëxpand and there is plenty of time for the opening to heal. So if we escape infection from the first opening, the chances of recovery are good.

Maj. H. Kennon Dunham, Oteen, N. C.: In those series of cases there were 30 in 2000, and there were 5 of those that were artificial; 25 were natural. We worked hard to find 25 in 2000. We found all we could; tried to tell the truth about them; whether there ought to be more or less, we did not get any more. The mediastinum moves over certainly less in cases of tuberculous inflammation of the mediastinum, especially the posterior, than it does in people who have spontaneous pneumothorax without that. There is not doubt about its moving over, but the effect of this is another matter.

We know so little about the intimate physiology of the lung that it behooves us to do a great deal more work before we try to draw any conclusions as to whether that mediastinum should be pushed over or should not. As to whether it does or not, I refer you to the recent article by Graham on Empyema. I do not believe that settles the subject, but the question arises, when you put air into one side, does that affect the negative pleural pressure on the opposite side, and to what effect? Now, to men who are doing a great many pneumothoraces, it would seem a very easy matter for them to put the needle of a manometer into the pleura of the opposite side from the one being collapsed to see what change in pressure has taken place there. You have to try those experiments on men, however, not animals, if you would know what change the mediastinum is undergoing, since the mediastinum and the elasticity of the fiber in the pleural are different in man and beast.

In the matter of treatment by means of pneumothorax, if you try to use it to cure every patient, you may go wrong and do a very valuable method of therapy a great harm. If you look at it as I do, as a palliative measure, then you will get some brilliant results out of these palliative measures, especially where you stop hemorrhages and coughs.

If, on the other hand, you use it as a sure treatment and expect cases to get along too well, or advise the relatives that this patient is going to get well, and expect it yourself, you may suffer disappointment.

One thing I hope the speakers in closing will do, which I do not want to take the time to do, and my ideas would not be different, that is to define spontaneous pneumothorax. Do we mean when we use this term "spontaneous pneumothorax" that it is a spontaneous or natural rupture of the lung as we get it in tuberculosis, or are we dealing specifically with the spontaneous pneumothorax most probably the result of emphysema of the lung in which there is practically no definite pathology to which we can attribute the break in the pleura. I wish they would define that, because it makes a lot of difference whether we speak of all tuberculosis as such, as spontaneous, or whether we call it natural.

I am very fortunate, because I see here my friend Dr. Fishberg who so glibly quotes exactly what I say, knows all about what I think. I assure you, Doctor, that you quote me this time absolutely incorrectly. I take great pleasure in reporting my having mistaken a case of cavity as a case

of pneumothorax, because in every way it very closely simulated that; but when you try to compare the value of physical findings in localizing pneumothoraces with the value of the x-ray so used, you are absolutely wrong. The x-ray is so much superior to physical findings that it offers no comparison. That the x-ray is a 100 per cent. machine is also wrong. It can make mistakes. We must use both methods. To-day it is most important, in the diagnosis of pneumothorax, to watch every single case with the x-ray plate so as to determine the differences of density and thereby learn the limits of our physical findings. There can be no other method.

Capt. Everett Morris, New Haven: In regard to Dr. Meyer's reference to the age at which pneumothoraces usually occur, I call attention to the statement made in my paper to the effect that it is found in early adult life, occurring almost invariably before the age of 40.

In the diagnosis of spontaneous pneumothorax, no one has mentioned the use of the manometer. Aron after 36 readings, found the normal pleural negative pressure to be 4.65 M.M. Hq. on inspiration and 3.02 M.M. Hq. on expiration. It has also been pointed out that the liver, on account of the intra pleural pressure, exerts only a part of its weight on the abdominal organs for the tension will hold up against gravity, a layer of liver about 5 cm. thick. The pleural cavities also balance the heart which is an index of change in pressure. The dislocation towards the sound side will be equal to the difference of pressure in the two cavities.

Any increase in intra pleural pressure after the elasticity of the compressed lung has been spent, is said to cause pressure symptoms.

Dr. LeRoy S. Peters, Albuquerque, N. M.: I want to reply to Dr. Fishberg that I mentioned positive pressure merely to condemn it; that rupture of the lung possibly is common in ordinary cases of tuberculosis, but in artificial pneumothorax rupture of the lung is not common.

After an artificial pneumothorax has been produced long enough you usually find a very thickened pleura which minimizes the danger.

I want to say to Dr. Parfitt that one cannot always watch and promptly tell, from manometer readings whether he is getting a pushed over mediastinum. I have seen the mediastinum pushed way over in which the manometer readings were minus 6 or 7. Dr. Dunham's suggestion that we get the needle in both sides fails to take into consideration the personal equation. It is hard enough, sometimes, to get the needle in one side in the average person. It would be better to try such experiments in some charitable institutions where patients can be made to do it.

PHYSICAL RECONSTRUCTION APPLIED IN THE TREATMENT OF PULMONARY TUBERCULOSIS

By COLONEL FRANK BILLINGS, M.C.

Chicago

Physical reconstruction may be defined as continual treatment, carried to the fullest degree of maximum physical and functional restoration consistent with the nature of the disability of the patient, by the employment of all known measures of modern medical and surgical management, including curative, mental and manual work (in wards, workshops, schools, gardens, and fields), physio therapy (thermo, electro, hydro and mechano therapy, massage, calisthenics, gymnastics, and the like) and sports, games and amusements in and out of doors.

The application of physical reconstruction in the treatment of soldiers disabled by illness and injury during the great war, was a new policy of the medical department of the Army. The measure had a few advocates, some tolerant but doubtful friends and many opponents in the medical department, including officers of the permanent military establishment and others holding temporary commissions.

The failure of many to recognize the therapeutic value of the measures enumerated is due chiefly to the fact that with the exception of the curative factors enumerated under physio therapy (and of these electro, mechano and masso therapy have been too often exploited by unqualified people and by quacks) the medical profession as a whole has had but little or no experience in the application of these additional forms of treatment of the sick and injured.

The profession has found no use for these curative measures because as a rule physicians and surgeons are satisfied with physical cure. The average physician rejoices when the patient with pneumonia has passed the crisis. Unless some unusual symptom attracts attention, he makes no investigation to ascertain if the lungs and heart have regained normal function. The average surgeon is happy if his patient with a fracture of a long bone gets through, without deformity or shortening of a lower limb and the possible suit for malpractice is escaped. As a rule he does not see to it that the joints and muscles of the involved extremity are exercised and trained to definitely restore function.

Modern medicine and surgery must take heed of functional as well as physical restoration. The physician and surgeon must continue to have an interest in the convalescent patient and to prescribe the necessary measures in proper doses to insure restoration of function or as nearly so as the nature of the disability permits.

The application of physical reconstruction in the treatment of the patient with pulmonary tuberculosis has been strenuously opposed by

many conscientious and honorable physicians. The objections advanced are sound in the sense of the application of the measure embraced under physical reconstruction during the active and febrile stage of the disease. On the other hand, I maintain that when indicated, physical and mental rest, even to the most absolute degree practicable, is as much a factor in physical and mental rehabilitation as physio therapy, curative work or play when these agents are rationally called for.

Tuberculosis is an infection which as a rule is focal in character. The primary focus usually located in a lymph gland or glands is acquired, usually in childhood. Later in life the pathogenic agents take on added virulence, or the resistance of the tissues of the host to general or to wider local invasion is diminished or both conditions are present. The causes of increased virulence of the pathogenic invaders and the reasons for the lessened immunity of the host need not concern us in this discussion.

With more general invasion and involvement of the lungs, the course of the disease depends also upon the degree of virulence of the invaders, including possible mixed infection and upon the degree of general and local tissue resistance of the host.

Experience has shown that during the acute or active stage of pulmonary tuberculosis, rest as absolute as practicable, is the best method of passive control of the disease. Unfortunately with some patients the virulence of the invaders is so great that the most painstaking application of rest treatment does not prevent the involvement of new tissue and a final hopeless extension of the disease. We all recognize the advantages of pure night and day air, rational feeding, correct personal hygiene, including adequate nursing, proper sponge bathing, and the use of simple medication when needed during the active stage of the disease. The contention for and against the use of specific and non-specific antisera or antigens administered hypodermically or intravenously to increase the resistance of the host to the invading micrörganisms or to destroy the infectious agents is not germane to this discussion.

If the patient is fortunate the active stage abates and in an indefinite time the patient reaches the stage of inactivity of the disease. The reward of improvement of the pulmonic disease by adherence to the rest treatment is associated, in the average tuberculous patient, by lessened tone of the tissues, especially of the muscles, and by relatively poor blood circulation. Inadequate blood and lymph circulation means lessened nutrition of the tissues generally, although the weight of the patient may not indicate it. Long physical rest begets mental unrest and discontent. In other words the patient's physical disease is much improved but the function of his mind and the circulatory and locomotor organs is far below the normal. Until the blood and lymph circulatory organs function properly, cellular nutrition will remain low. Rationally we can not prolong absolute rest beyond the active or febrile stage.

The second stage of treatment embraces alternating rest and *controlled* mental and physical exercise. Individual management is indicated throughout the whole treatment program. But in this second stage, the dosage of mental or physical exercise prescribed, and the frequency of the

repetition must be under watchful medical supervision. If the progress is favorable the bed rest periods become shorter and less frequent, and conversely the active periods in chair and walk become longer and more frequent.

Now it is during this transition period, between absolute rest and the ambulatory stage, or third period, of treatment that the wise physician will apply physio therapy as hydro therapy and massage, and occupational therapy modified in kind and dosage to meet the need of the individual patient.

The sponging with warm water and alcohol admissible in the febrile stage may become a sponge or spray bath in bed or in a chair, sufficiently cool or cold, to arouse physical reaction for the purpose of improvement of the lymph and blood circulation. Short periods of light friction massage of the extremities, in permissible cases, of the skin of the trunk will also improve the circulation, the tone of muscles, and the cellular nutrition.

Mental and manual occupational therapy should be applied as early as mental and physical activity is permissible. The problem is to divert the attention of the patient, by simple recreation, through reading, pictures, games, handicraft and the like, with a view to securing a genuine interest in the attainment of a worthy end. The end most certain to hold the attention of the patient and to claim his best efforts is his future vocation. Hence, the reading, the handicrafts, or academic study chosen to occupy the patient, for the sake of diversion, should be of a character, if that is possible, which will lead by successive steps to the more purposeful training which he may take during the ambulatory stage of the disease. Chair and porch patients will be able to take increased periods of occupational exercise.

In addition to what may be termed purely diversional occupations, such as woodcarving and whittling, toy making, weaving, bead stringing, blockstamping and the like, the patient may take academic courses in English and other languages, including arithmetic, penmanship and the like, read text books upon and practice stenography, typewriting, Morse and radio telegraphy, bookkeeping, banking and the like.

If the application of these measures is properly controlled by adequate medical supervision, the recovery of the patient will be enhanced. The lowered morale incidental to homesickness, idleness, and discontent, with all the retarding influence of these factors upon the improvement of the patient will be overcome by rationally applied curative manual and mental work.

When the patient has reached the ambulatory stage all of the measures embraced under physical reconstruction may be applied with benefit to the tuberculous patient. But medical supervisory control must continue. Hydro therapy in the form of the simple overhead shower or the hand spray may be applied safely and with great benefit by alternating from hot to cold for short periods. Few physicians realize the benefit and the ease and safety of the applications of the alternating hot and cold shower or spray baths. It is inexpensive and self applicable. The blood is made to flush the whole body and in consequence aids in washing out toxic

waste material and in the improvement of muscular tone and general nutrition. Pulmonary ventilation is improved.

The end result is equivalent to considerable active exercise like gymnastics or walking without the attendant fatigue of the latter. For those physicians who object to hydro therapy in the treatment of the hospital tuberculous patient, let me advise them to try it out with patients who have reached the afebrile stage and who show no tendency to hemorrhage.

Likewise rationally applied masso therapy will justify the expense of the necessary, qualified personnel to apply this form of therapy too often reserved for the wealthy patient.

In the ambulatory period, occupational therapy may be applied in more diversified forms, either prevocational or vocational. Shop and outdoor pursuits and especially the latter are applicable to the ambulatory tuberculous patient. The academic and commercial courses may be continued or shop and trade courses in motor mechanics, motor driving, engineering, electrical wiring and the like, or gardening, including greenhouse cultivation, farming, stock raising, and the like.

Controlled recreation in the form of graduated walks, gymnastics, calisthenics and games in and out of doors has an important place in the treatment of the convalescent tuberculous patient.

When the tuberculous soldier has reached the stage of arrest or inactivity of the pulmonary disease, he may be discharged from the army at this period. No physician possesses sufficient knowledge to judge the degree of virulence of the infectious microörganisms which remain in the lung tissue or in the bronchial lymph glands, or the status or degree of immunity of the general or local tissues of the host, to renewed activity and further tissue invasion by the infectious agent.

For the patient with arrested tuberculosis in civilian practice, the conservative physician desires to maintain and to improve the resistance of the host to the unfriendly parasites, by attempts to have the patient follow a rational hygienic life, and if the bank account permit, to spend seasons characterized by inclement weather at resorts, where favorable climatic conditions permit one to live comfortably in the open air.

These measures are correct and rational enough but why not adopt measures of physical reconstruction at this period of convalescence which will so completely rehabilitate the patient that he will be practically immune to further active tuberculous disease.

It will be an economy to hold the dependent tuberculous patient whose disease has been arrested in public sanatoria for a period sufficiently long to permit the application of the needed physio therapy, curative work and play, until the desired physical and functional rehabilitation has been effected. During this period real vocational training may be utilized profitably as occupational therapy. Dr. Philip King Brown has demonstrated that efficient training in pottery and tile making insures permanent cure, lucrative jobs in industrial life and that a sanatarium may become practically self-supporting if sensible trade training in productive enterprises is adopted as curative work. Dr. S. Adolphus Knopf has recently written and lectured upon the important subject of prevention

of relapses in cases of arrested tuberculosis among soldiers.[1] I heartily concur in the principles and practice announced by him.

Physical reconstruction is especially applicable to the patient with arrested or clinically inactive tuberculosis and should have wider application in the final hardening process before the discontinuation of individual medical supervision.

I am now and long have been an advocate of the application of physio therapy, occupational therapy and recreational play, modified as I have attempted to indicate, in the hospital and sanatarium treatment of tuberculous patients.

The results of the application of these measures in the treatment of disabled tuberculous soldiers in the military sanatoria have been so beneficial that it is the writer's belief that curative work, masso therapy, hydro therapy and regulated play will be hereafter practically applied, when local conditions permit, by all phthiso therapists.

During April, 1919, there were approximately 6000 tuberculous patients in the seven military sanatoria. Of those who took curative work, 2941 were occupied with the handcrafts and arts, 339 took ward academic instruction in languages and the like; 1932 received training in commercial and professional subjects; in technical courses including carpentry, shoe repairing, motor mechanics, agriculture gardening, stock raising and the like and 725 utilized recreational play in and out of doors. The sum of these figures gives the total enrollment for the month. The total number of patients who took curative work was less than the last figure because some patients were enrolled in two or more curative work occupations.

Finally it must be recorded that the almost universal testimony of the commanding officers of the hospitals, the ward surgeons, the educational personnel, and the patients is to the effect that curative work in wards, schools, shops, gardens, and fields, is of the greatest psychological and material value in the treatment of pulmonary tuberculosis.

Tribute must be paid to the fine women who as reconstruction aides in occupational therapy made the ward training in the arts and crafts, in academic and commercial study, a success. The occasional misfit among them does not militate against the great value of their presence and services in the wards for the benefit of these disabled soldiers.

The chief of the educational service and the personnel of instructors have given whole-hearted, qualified service,—splendidly coöperating with the ward surgeons in the work. A few ward surgeons have not subcribed to the principles involved. They are a small minority, who would become advocates probably of physical reconstruction under a favorable environment.

DISCUSSION ON PAPER BY COLONEL BILLINGS

Dr. Hugh M. Kinghorn, Saranac Lake: This question of occupational therapy has been of great interest to me. I might say that what

[1] Prevention of Relapse in cases of arrested tuberculosis among soldiers. Journal A. M. A., 1919, LXXLL, 539.

Colonel Billings has said I think is absolutely sound right through. There is no question of the wonderful value of occupational therapy.

We must distinguish between occupational therapy, or vocational training, as it is sometimes called, and work therapy which is also called graduated labor. All through, I think Colonel Billings has made himself perfectly clear that this occupational therapy is not the heavy muscular work therapy that is advocated at Frimley, in England, and at other sanatoria. It is, in other words, a therapy where the hands are used, but it does not use the muscles of the chest. We have to distinguish between those two things, heavy muscular work or work therapy, as contrasted against occupational therapy, or vocational training.

Now, as I said, there is no question of the wonderful value of occupational therapy, particularly to soldiers. At a sanatorium which I am interested in, we had to deal with the returned Canadian soldiers at the beginning of the war. For a long time it was most difficult to keep these soldiers in the sanatorium. They were forever disappearing until Dr. Byers, who was in charge of the sanatorium, adopted occupational therapy. Immediately the difference in the attitude of the soldier was simply marvellous. Instead of 40 per cent. trying to desert, it came down to probably just a few, or practically none at all. They were all satisfied. Not only that, but the occupational therapy taught them a great deal.

I might mention in passing that this occupational therapy has been practiced at the Trudeau Sanatorium under Dr. Lawrason Brown and Dr. Heise for many years. They have had a workshop there where these crafts have been used, and they have advocated a great many outdoor occupations in the summer that are of great benefit.

With regard to the massage that Colonel Billings mentioned, I think that massage is also of great value, particularly in those cases that you cannot seem to get along towards recovery; they are not strong enough to exercise, perhaps. In regard to the water treatment, I think we should make far more use of that.

A very important point which the Colonel mentioned was holding these patients long enough at the sanatorium. I have felt for very many years that it has been a great mistake that the average duration of a patient's stay in a sanatorium is three months or less. To a working man, a man who has to return to his work, it is simply a drop in the bucket. When we consider that in private practice the average duration is almost a year and a half to two years, and when we consider the wonderfully different results we get in private practice as against the sanatorium work, I think the time has now come that we should concentrate and get the time prolonged from six to nine or twelve months, or longer. When the patient is in condition, he should be put at this occupational therapy. You not only get a better mental condition, but you get men fitted to resume work when they leave.

Permanent results are now coming in. I might say in passing, that the permanent results with the rest and exercise treatment, that is, with occupational therapy, are a great deal better than from the heavy mus-

cular work, the work therapy as employed at Frimley, so that I feel if we employ occupational therapy and keep the patient longer at the sanatorium, the results will be very much better in every possible way.

Dr. S. A. Knopf, New York: To my mind, Colonel Billings has presented a wonderful paper. Only a few weeks ago I completed a lecture tour extending from the Atlantic to the Pacific, lecturing before medical men and the members of tuberculosis societies, among whom I am glad to say were always a number of men in uniform. These men were particularly interested in my talks because I lectured on the prevention of relapses in arrested cases of tuberculosis among soldiers and sailors. In those lectures I recommended masso-, hydro-, aero-, helio-, and psychotherapy in judicious combination as our only means to prevent a relapse of pulmonary tuberculosis in the military and civilian population. I do not believe I can make a better contribution to the discussion than by telling you how much I learned from the criticisms which came to me from the floor and from those who had read the abbreviated address on the subject in the Journal of the American Medical Association of February 22, 1919. One army officer stated that the tuberculous soldier did not need massage, as he came to the government hospital with strong, firm muscles. I grant that the major was right, but after that soldier has been lying on his back for three or six months, taking, as he should, a complete rest cure, not even breathing deeply if his lesions are active, he will then have soft muscles. I, therefore, believe that before we put him again to work, we should massage him thoroughly, so as to prevent his creating fatigue poisons and possibly bringing about a relapse.

Another objection was raised because of the difficulty in getting masseurs and because it was too expensive. Well, I have been practicing massage among private patients for many, many years. I did not always have to do it myself either. For my well-to-do patients who could afford it I sent a masseur or masseuse to their home. When I have a poor patient I teach the mother, or the father, or the brother, or the sister how to massage. It is surprising how many people you find with a natural aptitude for this work. It does not take very much time to teach a good, fairly intelligent mother to massage her daughter, or a father to massage his son, or vice versa. Friction, kneading, tapping, and then stroking—those four movements are all that is necessary to bring about a good condition in a flabby, muscular system. My military critics asked me, "Where can we get all the masseurs for the soldiers when we have from six to eight thousand of them?" In previous addresses and publications and by direct communication to the Surgeon General I have recommended teaching the blind soldiers to be masseurs. Also I recommended the teaching of massage to as many as want to learn it of those who have been injured by bullet, shell, or otherwise in their lower extremities only, but who could work with their hands. In addition, there are many soldiers who are willing to work at anything and who are looking for a job; some of these would gladly learn to massage. It offers a good means of livelihood. We do not resort to massage often enough to-day.

Another objection was raised to my teaching the practice of the respiratory exercises. It was said that by letting the patient breathe deeply one might stimulate the tuberculous process and hasten a relapse. To this I merely replied that I was not dealing with patients in my paper, but had been speaking about arrested cases who are no longer patients. The next question asked was "How can one tell exactly when the case is arrested?" I am willing to own that I have made mistakes by allowing patients to work too soon, but now I have become more careful. Before I put my patients to physical work, I teach them graduated breathing exercises very carefully. After a few days I examine them again and determine whether there has been a reawakening of the lesions. While the patient is lying down or reclining on a chair, he breathes very slowly. Whatever exercise he does afterwards, he must breathe more forcibly. The frequent re-examinations after he has practiced a series of breathing exercises will tell me whether or not the patient is an arrested case and whether or not it is safe for him to go to work. I confess I do not consider my skill in physical examination sufficiently great to be absolutely certain as to the arrest of the case without these precautionary measures.

Lastly, I believe that when we are able to tell a patient who has been lying on his back for months, that we are now beginning to prepare him for work by massage, a series of breathing exercises, and hydrotherapy, we increase his morale materially. I have seen it published in lay papers that the morale in some of our government tuberculosis hospitals is not as good as it might be and that the patients are frequently found in a state of depression. I have not seen all the government hospitals, but in those I have visited I have not observed that the patients were depressed and the morale lacking. Yet if occasional depression does occur and the morale among the men is not as it might be, do not let us knock the government or blame the commanding officer or his staff. Put yourself in the position of the tuberculous soldier who has spent two years fighting in France and then is found to be tuberculous in the first stage. He is on his back for weeks and weeks, yet he does not feel sick. He has little to do, he becomes restless and suffers from nostalgia; he wants to go home but the commanding officer, knowing better, insists that he must stay. Can you wonder that occasionally the morale suffers even in the best of hospitals? As already stated, masso-, aero-, and hydrotherapy, as suggested by Colonel Billings, will not only heighten the morale of our tuberculous soldiers, but I am firmly convinced will also lessen the number of relapses and make of our one-time tuberculous soldier hero a better and more useful citizen.

Dr. Lawrason Brown; Saranac Lake: I agree thoroughly with Colonel Billings and the other speakers. We started our work in occupational therapy at Trudeau some twelve or thirteen years ago, because the patients were suffering from ennui. We had considerable trouble before that. I think after that we had very little trouble, and no patient ever complained to me that he had nothing to do. We tried for a time to teach them new occupations. In that we were unsuccessful. We did teach possibly one or two men to become telegraphers, and one man got

a position on the New York Central Railroad in the Adirondacks. In the vast majority of cases they preferred to take up their old occupations, because they made their living more easily in that way.

I think occupational therapy is one of the most important things we can introduce. From what I can gather, it has been marvelously successful in the army. I want to congratulate the gentlemen who introduced it.

Colonel Billings: I have but little more to say. It must be conceded that occupational therapy is justified only when it is applied as a curative measure. This applies to patients suffering from all forms of disability including tuberculosis. Hospitals cannot become technical or trade schools. My experience in the medical treatment of patients in the army and also in civil life proves to me that curative work which approached preoccupational or even occupational training is more likely to arouse the interest of the patient. This is natural because after he is trained in some occupation it will be of benefit to him after his discharge from the hospital. In the earlier application of curative work in military hospitals the ward work was what may be termed "kindergarten" in character. This was later adjusted to make the ward work of a more purposeful character. The types of war work adopted have been those which were related to the curative work applied in the ambulatory stage.

Before the armistice was signed disabled soldiers in military hospitals eagerly sought occupation in wards, shops and fields. This applied to the tuberculous men as well as to others.

In 1906 I was a member of the State Board of Charities of Illinois. At that time there were approximately 12,000 insane patients in the state hospitals; and altogether 17,000 dependents. The treatment up to that time was purely custodial in character. Through the influence of the Board of Charities curative work was adopted as a measure of treatment in all of the institutions. Handcrafts were taught in the wards and shop work in those institutions where edged tools could be used. Necessarily the insane were not allowed to use instruments with which they could do self injury or do injury to others. Out-of-door occupations were especially chosen in the form of work in gardens and fields. To this end land was acquired by purchase or by rent for each state institution. The application of curative work in the state institutions was instrumental in the abolition of restraint and of the use of opiates and other harmful drugs in the care of the insane. Curative work has so improved the conditions in the state institutions of Illinois that visitors come from all parts of the United States and from Canada to view the work.

I want to predict at this time that the application of curative work in the treatment of tuberculous patients is beneficial and will be universally adopted. Occupational therapy for the insane is recognized as a very valuable measure and if it is not applied the superintendent or other responsible officer is subject to criticism. It is my belief that a like statement is germane to the application of curative work in the treatment of tuberculous patients.

THE EPIDEMIOLOGY OF TUBERCULOSIS IN THE MILITARY SERVICE

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CERTAIN advices from France have recently brought up the question as to the degree to which our soldiers are protected against infection by reason of previous acquaintance with the tubercle bacillus. Whatever our theoretical views as to the infectiousness of tuberculosis for the civilized adult, there is no doubt that practically we act as if there were little danger of infection passing from man to man. Our notions of the danger of such infection are blunted by the absence of unmistakable evidence that they take place, at all events that they take place frequently severely and on a large scale. But for the really unprotected there is no doubt that, as Hamburger says, tuberculosis is as infectious as measles. If there is, therefore, any reason to suppose that a considerable number of our soldiers are exposed to primary tuberculous infection with all its possibilities of acute and fatal disease, it is our duty, so far as we are in any way responsible for the health of the army, to inquire closely into this matter.

The evidence upon which is based the view that many of our soldiers are entirely unprotected is the following: At the Red Cross Conference on Tuberculosis held in Paris in November, 1918, Major H. E. Robertson[1] reported that he had worked during the first year of the war with Aschoff in Freiburg and that in 100 autopsies made for Pick, 70 per cent. showed deposits in the lungs and bronchial glands, whereas in making autopsies on our soldiers he had been able to detect tuberculosis in less than 25 per cent. Major D. J. Glomsett[1] reported at the same conference that of 308 autopsies at Base Hospital No. 15, only six deaths had resulted from tuberculosis, that is, 1.95 per cent., and that probably eleven per cent. of his autopsies have shown definite (tuberculous) deposits. In a later unpublished paper, Major Glomsett states that tuberculosis has played an insignificant rôle as cause of death in this war, only 2.5 per cent. of deaths having been due to it. He had made a rather careful search for tuberculous lesions in all the bodies examined, and found them in only 54 instances (or 16.6 per cent.). He says that the "primary focus" is much more frequently found in older persons who died from other causes than in these soldiers, he having met with such lesions in more than 50 per cent. of persons over 50 years of age. On the other hand, Colonel Richard Cabot reports to the Conference from Base Hospital No. 6 that of 21,738 patients 63 were cases positive for tuberculosis, 51 of these

having positive sputum and tuberculosis having been found at autopsy in 12 cases. In addition to this group of 63 positive cases there were 100 cases of probable pulmonary tuberculosis with negative sputum. Colonel Cabot says that the cases occurred chiefly among soldiers who had not been specially examined in the United States, and that no incipient cases were recognized. While tuberculosis is relatively rare, the cases which do occur are said to be of an acute type. The conclusion that our soldiers are in danger of primary infection in a considerable percentage is drawn from the fact of the acuteness of the disease when it develops in France taken in connection with the autopsy findings reported by Majors Robertson and Glomsett.

In analyzing these data it is necessary to consider first how the autopsies were conducted. Evidently the percentage of tuberculosis found will depend upon the thoroughness of the examination. In pursuing the same method in both groups Major Robertson was able to find lesions in 70 per cent. of the bodies of German soldiers as against less than 25 per cent. in our soldiers. We may conclude that the Germans are more thoroughly tuberculized, probably that their initial infections were larger than ours. It does not prove necessarily that the approximately 75 per cent. of our cases which were negative had had no tuberculous infection; it only shows that the methods adopted were not sufficient to discover the evidences of such infection.

Long practice and great patience in minutely dissecting and examining the tissues are necessary in order not to overlook minute foci. The findings of Naegeli and Burkhardt are the best-known observations. Burkhardt[2] found in 1262 sections of adults 91 per cent. tuberculous. Of the 113 cases that were not so considered, he remarks that he does not affirm that they were absolutely free of tuberculosis and that he believes rather that it was present but not found. Burkhardt states that the accuracy of the investigation grows extraordinarily with practice, that parts which would have been put aside at the beginning, at a later period of the investigation showed tuberculous changes when subjected to microscopical examination. Naegeli's[3] first 146 sections in a total of 420 autopsies in adults gave a frequency of tuberculosis of 40 per cent., his last series 97 and 98 per cent. for adults. In his later work when especial attention was paid to the search for tuberculous lesions the percentage rose by increasing practice and experience from 75 per cent. to 98 per cent.

Another matter which influences greatly the percentage of positive findings is the criteria upon which the pathologist relies to decide as to the tuberculous nature of lesions that may be found. Naegeli's position seems to me the correct one. He disregards loose and narrow adhesions but considers that firm, flat adhesions near the apex connected with the other findings generally permit the finding—tuberculosis. Indurations which were not localized were not counted tuberculous, but sharply demarcated, slaty indurations of the apex, and thick, white, radiating depressed scars point to a localized not a diffuse process which can hardly be anything else than tuberculosis. What confirms the consistent

investigator even more in his conception of the almost regular presence of tuberculosis, Naegeli says, is the unbroken series of pictures which form a transition from typical tuberculosis to those findings which in themselves prove nothing, and he will reach the same result when he compares the lesions of the old, in whom the demonstration of tuberculosis in such changes becomes more difficult with advancing years, with those of the young in whom it is easy. Burkhardt, on the other hand, regarded only caseation and calcification as signs of tuberculosis and found 91 per cent. of his 1262 adults positive. We may ascribe the difference of six or seven per cent. between the findings of Naegeli and Burkhardt to the more liberal interpretation of the former. That this more liberal interpretation is more nearly the correct one is shown by its closer agreement with the results of the cutaneous tuberculin tests followed in negative cases by the combined depot and "stich" reaction of Hamburger. Albrecht found in his autopsies in children a very close correspondence between his findings, based on microscopical investigation and the inoculation of animals, and the percentage of tuberculosis found by Von Pirquet in living children.

It is evident that the higher the immunity, the less there will be of caseation and calcification so that pathologists who disregard everything besides these changes as evidence of tuberculosis must necessarily overlook a class of cases most important to recognize for a correct understanding of the pathology of tuberculosis. Naegeli hits the mark when he considers the distinct localization of the process as evidence of its tuberculous nature. But while he confines himself to pleura and lung parenchyma we would call attention in addition to the localization of the lines seen in the radiograph which connect the hilus with the superficial lesion and are the more distinctly localized the higher the immunization. These lines, rightly interpreted, are believed to constitute an important addition to our resources for the diagnosis of latent, inactive or healed tuberculosis. When death has occurred from other causes than tuberculosis radiographs of the lungs after removal from the body are also of great assistance to reveal the presence of scattered small and healed tuberculous foci, as Opie[1] has shown. In his autopsies of American soldiers 35 per cent. had calcified tubercle of the mesentery, 15 per cent. calcifications in the lung but not in the mesentery.

To obtain high percentages and accurate results, it is necessary to resort to the microscope in doubtful cases as was done by Naegeli and Burkhardt and a further resource is the inoculation of animals with fragments of the suspected tissues. But even with the use of these methods it is doubtful whether the total percentage of tuberculosis actually present is discovered. Thus experience has shown that tubercle bacilli may be found in smears and on histological examination though the tissues concerned are negative upon inoculation, and conversely that tissues inoculated with positive results may contain no tuberculous foci nor any tubercle bacilli discoverable by the microscope, even that cultures may, rarely, be made with success though inoculations be negative. There is, therefore, no single pathological method nor is there any combi-

nation of pathological methods which will absolutely determine that the individual in question has never been infected with tuberculosis, hence all negative series may contain a certain number of slightly infected cases.

We do not know the details of the methods of Robertson and Glomsett further than the remark of Glomsett that in fully two-thirds of cases of what he calls "fibrous pleurisy" there was no evidence of tuberculosis. It is fair to assume that their examinations were conducted without the aid of the microscope. If this is the case it would be quite incorrect to compare their results with those of Naegeli and Burkhardt, for example, both of whom made use of microscopical examination in doubtful cases. What might be expected from their methods is a positive percentage somewhat less than Naegeli's 40 per cent. in his first series.

We have however a recent series of post mortem examinations in which a German surgeon searched for tuberculous lesions, with results which offset those of Robertson and Glomsett. Oberndorfer[4] has recently reported a series of autopsies, three-fourths of which were for gunshot wounds or other acutely fatal affections, in which he found tuberculous changes in only ten per cent. In the 35 cases of this series in which tuberculosis was the cause of death there were nine cases of miliary tuberculosis and four of tuberculous meningitis, almost one-half of the fatal cases belonging therefore to the rapid forms of tuberculosis. In this respect his findings are as we shall see comparable with those of Glomsett, and since the standards that he adopts seem very similar to those of the American observers his percentages are also fairly comparable with theirs. It is true that Oberndorfer admits that on account of the unfavorable conditions under which the autopsies are sometimes conducted in the field tuberculosis may have been overlooked in some instances and grants that the cases not found may be as many as those reported which would bring up his percentage to 20 per cent. But the same or similar sources of error exist no doubt in the American observations so that it is fair to retain his original figures of ten per cent. of tuberculous changes at autopsy for purposes of comparison with the less than 25 per cent. of Major Robertson and the 16.6 per cent. of Major Glomsett. We thus arrive at the surprising result that the German soldiers who at Freiburg gave positive findings for tuberculosis in 70 per cent., in the field are found to have a lower percentage than the American soldiers! The explanation of these discrepancies besides a possible difference in the criteria adopted is of course largely the small number of cases from which the percentages are determined. The 420 adult autopsies of Naegeli and the 1262 autopsies of Burkhardt represent none too large numbers from which to draw conclusions generally applicable. Oberndorfer does not give the total number autopsied nor does Major Robertson. Now it is important to note that Oberndorfer does not apparently entertain the idea at all that the small percentage of tuberculous lesions found by him invalidates the well established fact of the tuberculization of the German population as shown by a positive response to tuberculin tests. The cases of fatal tuberculosis represented to his mind acute deterioration of a disease

not very manifest previously or cases previously sound in which the progressive tendency of the disease may be ascribed to the increased fatigues of field service. In these cases he says manifestly the immunization was not high enough, in some cases one must think of a new infection. Evidently for him the new infections if such there be are reinfections and constitute but a small percentage of the cases observed. Goldscheider[5] goes further. He says that he has not seen cases of the transmission of tuberculous infection and states that Schröder is of the same opinion. Much remarks that it is certain that the reinfection of the body in tuberculosis proceeds not from without but from within, *a fact recently fully established by observation of the tuberculosis of soldiers.*

Now supposing it to be true that our soldiers are in danger of primary tuberculosis, in view of our practical unfamiliarity with primary tuberculosis of the adult it is fair to ask the question: What are the lesions and what is the clinical course that is to be expected? To answer this question it will be necessary to make a rapid sketch of the pathologico-anatomical findings in fatal cases of tuberculosis and their relation to the immunity of the individual.

Primary tuberculosis is seen with us practically only in young children. It implicates chiefly at the outset the lymphatic system. According to Ranke[7] a general infection of the lymph glands is the first stage of the tuberculosis of childhood. But not all tuberculous infections of early childhood result in manifest and fatal disease. As has been shown by tuberculin reactions, a very considerable percentage of young children go on to develop an immunity as the result of the early inoculations and may never exhibit any manifestations of clinically apparent tuberculosis. In such cases we may infer in analogy with the results of experimentation with animals that the dosage of the infectious agent has been small and that the native resistance has been sufficient to prevent early and rapid multiplication of the infecting bacilli. As the result of the almost instantaneous reaction of the tissues to the new poison, the lymph glands as well as the other tissues acquire at first an increased activity which in time becomes an insensitiveness to tuberculous infection whether exogenous or endogenous so that reinfections produce, according to the dosage, either no visible lesion or one that heals. The fundamental distinction between primary tuberculosis and secondary tuberculosis is that in the latter the glands of the part do not swell. The child which has received a tuberculous infection of the nature of a vaccination against the disease never has any marked swelling of lymph glands whatever its subsequent history as respects tuberculosis may be.

If the initial dosage is larger, the tuberculosis of the glands advances more rapidly for a time than the immunization of the tissues with the result that the lymph glands swell to a certain extent and become more or less caseous. There is a great variety of possibilities as respects the extension through the lymphatic system of this type of tuberculosis as Harbitz has shown. The disease is more severe than in the first type, the caseations present are a constant menace and there may be involvement of various viscera according to the location of the most seriously affected

lymph glands, but still the course of the disease is chronic and it is not necessarily incompatible with a very considerable duration of life.

If the initial dose is still larger or if native resistance is low or if both unfavorable factors are present, the glands become greatly swollen, caseate and suppurate with early overflow upon the viscera. The rupture of the glands into bronchi or into blood vessels is responsible largely for the acutely fatal terminations of primary tuberculosis, the generalized acute miliary tuberculosis, often most conspicuously manifest when it affects the brain as tuberculous meningitis, the acute miliary tuberculosis of the lungs, caseous pneumonias and broncho-pneumonias. In the child the acuteness and generalization of the tuberculous process results in a disease which clinically bears little resemblance to the pulmonary tuberculosis of the adult. The sudden irruption of numerous tubercle bacilli into the circulation and the development of massive tuberculous foci in the internal organs produces, says Frankel, a stormy course—in the most severe cases a typhoid condition with great prostration, swelling of abdomen, delirium, dyspnoea, cyanosis and death in one to three weeks.

In the child, says Ranke, tuberculosis of the glands and of the serous membranes determines the picture, in the adult tuberculosis of the lungs in the form of phthisis. He goes on to inquire whether the great differences between the tuberculosis of the young child and of the adult are to be explained by supposing a lessened susceptibility to the disease on the part of the adult organism and remarks that it is a question whether the adult, if placed under the same condition as the child, would really be less affected than the latter, but that the demonstration by means of tuberculin tests of a tuberculous allergy in by far the majority of adults leaves us no material available for comparison with children. Here we must differ with Ranke. Observations of the tuberculosis of the tropics and of all races that have not been in contact until recently with tuberculosis show that the really primary tuberculosis of the adult differs in no material respect from that of children. It is not age but protection resulting from previous acquaintance with the disease that determines the characteristic type of adult tuberculosis—chronic phthisis limited to the lungs and to parts of the lungs.

Heinemann[8] in Sumatra remarks of the Javanese laborers from rural districts that they have a tuberculosis unlike that of European adults, a very severe acute or subacute disease which in its tendency to generalization resembles the tuberculosis of earliest childhood in Europe. And again, "the course of tuberculosis is usually rapidly fatal." Cheesy lymph gland tuberculosis seems to have been the dominant feature in 50 per cent. of his cases with overflows as caseous pneumonia, miliary peritonitis, miliary pleurisy and miliary pericarditis. Tuberculosis of serous membranes is a conspicuous feature in primary tuberculosis. Mouchet[9] reports from Leopoldsville in the Belgian Congo, besides miliary lesions of the pleura, the pleural cavity filled with a voluminous lardaceous material or covered with large yellowish granulations forming veritable tumors, also analogous cases of tuberculous peritonitis and of meningitis. The peripheral glands were affected, especially the cervical

which were enormous and softened. In nearly every case there were large caseations of mediastinal and hilus glands, sometimes also of the mesenteric glands. Clark[10] in 452 autopsies of West Indian Negroes in the Panama Canal Zone found 62 cases in which tuberculosis of the pericardium was the cause of death, in 15 cases there were large caseous nodules in the myocardium. He had several cases in which the only extensive focus was in the heart aside from masses of thoracic glands. The spleen was involved in 263 cases, the liver in 238, the peritoneum in 127, the meninges in 108 of the total number of 452 autopsies. These hasty glimpses of a large subject may suffice to show that the unprotected adult is as helpless as the child against tuberculosis, in fact seems to have, if possible, a more malignant type of the disease.

We have then three types of manifest tuberculosis: (1) Primary tuberculosis characterized by its acute and fatal course, its tendency to generalization, its absence of evidence of reparative processes and an acute and often an enormous lymph adenitis which accompanies all the extensions of the disease, the glands connected with all involved organs becoming enlarged.

(2) The tuberculosis of an imperfect immunity, characterized by more or less chronic involvement of the lymph glands manifested by swelling and caseation with usually a chronic involvement of the lungs but with a tendency to implicate other viscera also, as well as the bones and joints—the type of tuberculosis which is sometimes called scrofulous tuberculosis. It might be called the type of chronic generalization in the lymph gland system. The glands of regions newly involved in the tuberculous process do not become acutely inflamed. As its chronic course would lead us to expect, there is often some evidence of attempts at localization and repair in this form of tuberculosis.

(3) Typical chronic phthisis in which the glands do not swell and the disease is mostly limited to the lungs with abundant evidence of defensive reaction in the formation of fibrous tissue, extensions, if they occur, being usually of intestine or larynx.

Tuberculosis having been the cause of death, the pathologist in his interpretation of the case as respects type has first to examine the glands. Are they voluminous and succulent without caseation, or are they freshly caseated or suppurating? Do the enlargements occur as great packets of glands, are other peripheral glands, as the axillary and inguinal, involved as well as the cervical? Are the glands that drain a diseased organ enlarged? Is there involvement of more than one serous membrane? Is the tuberculosis present in these membranes extensive miliary tuberculosis or are there masses of caseation or of tuberculous granulations? Do the other important viscera besides the lung, as the liver, spleen, kidney and heart show conglomerate tubercles or a large dissemination of smaller macroscopic foci? If the answers to all or to most of the above questions are negative there are certainly grave doubts as to the existence of a primary tuberculosis. The most important evidence of the secondary nature of tuberculosis in the adult is the absence of participation of the lymph gland system in hematogenous and lymphogenous extensions of

the tuberculosis. No tuberculosis of the lung for example, however acute, can possibly be admitted to be primary if the hilus and tracheo-bronchial glands remain relatively small. This fundamental distinction between primary and secondary tuberculosis is altogether too generally disregarded.

Of Glomsett's fatal cases, four were cases of miliary tuberculosis, one of tuberculous meningitis, one of generalized tuberculous peritonitis and two of ulcerative pulmonary tuberculosis. He reports also a case of tuberculous lymphadenitis of mediastinal nodes. Whether death was due in this case to tuberculosis or not does not appear, probably not, since even in primary tuberculosis death from this lesion without the involvement of important organs is not probable. In this series then, there are six cases, possibly eight including the ulcerative lung tuberculosis which, so far as is shown by the report, might have been of a primary or of a secondary nature. There appears, as yet, no reason to infer from the nature of these lesions that the tuberculosis was primary. In fact it is probable that the absence of remark as to greatly enlarged glands, etc. is evidence that they were not the lesions of primary tuberculosis. An antemortem generalization of tuberculosis in the form of miliary or macroscopic tubercle is the rule when death results from uncomplicated pulmonary tuberculosis. This simply shows that the organism worn out by the long struggle has ceased to resist. Sometimes also cases with small and old tuberculous foci develop an acute general miliary tuberculosis. Why the immunity should be so completely lost in such cases we can only conjecture. But that they are not as a rule manifestations of primary tuberculosis is certain and systematic writers rightly consider acute general miliary tuberculosis as secondary to old lesions.

When soldiers have been carefully examined for tuberculosis on entrance into the military service, the cases of typical phthisis which pursue a chronic course are eliminated—much of the tuberculosis that subsequently appears occurs in individuals of a more athletic type. It is a question that may be raised whether one of the reasons why such individuals are athletic is because their development has not been impaired by early and intimate acquaintance with the tubercle bacillus. However that may be, it is true that the athlete when he does acquire manifest tuberculosis has frequently a rather acute type of the disease. The writer was informed in 1908 by a German army surgeon that there was but little tuberculosis in the German army but that when it did occur it was of an acute type. The tuberculosis examiners of our army report that the men who broke down in the service with tuberculosis were more often not those with long chests, with rather delicate physique, perhaps with some slight old impairment of the apices, whom they had admitted with some hesitation, but men of a more athletic build whom they had not believed to be in any danger of the disease.

We hold, then, that the acute type of tuberculosis which seems to be frequent in our army is the type which is to be expected in what has been called the unavoidable percentage of tuberculosis occurring in an army from which typical phthisis has been eliminated by careful examination.

To avoid misunderstandings a word should be said as to the relation

of the more chronic enlargements and suppurations of lymphatic glands to the immunity of the individual. Suppuration of cervical glands is a common surgical affection. It is not certain that there may not be a complication with other microörganisms in the more chronic type. However that may be it is probable that in some cases the condition is purely tuberculous, being analogous to the abscesses which form as the result of large injections of dead or non-pathogenic tubercle bacilli. Müller[11] has recently reported cases of enlargement and suppuration of cervical glands in Austrian soldiers who had long been in the trenches, especially in those who had served in the cold and wet of high altitudes. From microscopical studies he decided that the process was tuberculous. He draws the surprising conclusion that his results show that immunity from tuberculous infection has less importance than Romer and his school would ascribe to it. But he makes two very significant statements in this connection; first, the subjects of this adenitis were strong and well, the cervical affection was a purely local process; second, the men affected with the disease had for the most part carious teeth and infected mouths. Now if the process in the glands was purely tuberculous the fact that the process remained localized and the general health remained good was the best evidence that high immunity still existed. On the other hand if the suppuration was due to infection with some other microörganism of a gland already tuberculous the fact that it existed would be no proof of the loss of immunity against tuberculosis.

At a recent autopsy of an Indian soldier nearly all of the cervical glands were enlarged the size varying from that of a navy bean to that of a small marble. The mesenteric glands were more enlarged there being one packet of considerable size. Death had occurred from tuberculous peritonitis. There were conglomerate tubercles in spleen, kidney and in the capsule of the liver. The lungs, besides a comparatively recent cavity in the right apex, showed very extensive and almost universally disseminated peribronchial tuberculosis. The question arose whether this was a case of primary tuberculosis. The answer was in the negative for the following reasons: The large number of slightly enlarged glands of the neck suggested scrofula rather than primary tuberculosis. The lung contained lesions of varying age,—the cavity was older than the peribronchial tuberculosis. The thoracic glands were not swollen. The intestine did not share in the tuberculous process in a manner parallel to that of the mesenteric glands. Such few ulcers as were present were small and showed little evidence of activity. The swelling of the mesenteric glands could not have been due to primary infection, on account of the absence of a primary focus in the intestine. It is altogether probable that this swelling was the result of a mixed infection, for we know that, as Ungermann has pointed out, the mesenteric glands more often contain bacteria rapidly fatal for inoculated guinea pigs than do the thoracic and cervical glands. Indeed, whatever may be the explanation, it is thought to be a fact that in autopsies of tuberculous subjects even where there is undoubted evidence of a previous immunization it is almost the rule that the mesenteric glands are of a larger size than that of the other glands which neighbor

foci of tuberculosis. Great enlargement and suppuration of lymph glands are not therefore necessarily an evidence of primary tuberculosis however acute the terminal manifestations of the disease may be. To prove primary tuberculosis the glands nearest to organs extensively involved in the tuberculous process must be enlarged. Participation of the glands in the extensions of tuberculosis is a regular and characteristic feature of primary tuberculosis in man as it is in the experimental primary tuberculosis of animals. It is not necessary that the glands shall suppurate or even that they shall be caseous, simply that a fresh lymphadenitis shall everywhere accompany the acute extensions of tuberculosis.

Many questions as to the primary tuberculosis of the adult suggest themselves, not all the answers to which are supplied from experience gained under the conditions of civilization. The first is: What is the cause of the ubiquitousness of the tubercle bacilli and what is the likelihood of the unprotected adult becoming infected under the conditions of civilization?

Considerable work has been done of late years by the French and German medical men who live in the tropics in determining by means of the von Pirquet reaction the degree of tuberculization of the tropical native and their investigations throw light upon some phases of this unfamiliar subject. The tropical native is very readily infected with tuberculosis. It has puzzled observers to note that the presence of Europeans, Hindoos, Chinese and other men of the older civilizations may lead to tuberculous infection of the native although there were no open cases of tuberculosis among these newcomers. The Musselman and Syrian peddlers of tropical Africa are accused of spreading the infection, the Lascar crews of ships likewise.

Natives of a tropical race who have been city dwellers seem to have the same fatal facility for communicating the disease to their unprotected countrymen. Thus when the eastern coast of Sumatra was devoted to the production of rubber after 7000 additional laborers, some of whom came from Batavia or other cities of Java, had been added to the previously carefully selected force on the Dutch plantations, the incidence of tuberculosis rose from less than .3 per cent. to nearly three times that figure. Acutely fatal cases of tuberculosis occurred, but these were not among the new arrivals, the disease attacked laborers who had been with the company for years. With two exceptions none of these patients could be shown to have associated with open cases of tuberculosis; they had, however, been thrown with other laborers who have a positive reaction to the cutaneous test (3.5 per cent. of 3580 laborers had been found positive for this test). As Heinemann,[8] who reports these facts, says, the bacillus-carriers were evidently at times "bacillus-excreters." Calmette[12] boldly expresses the opinion based on his experiments with animals that the individual who has a tuberculosis vaccination, that is, who shows by reaction to tuberculin his previous contact with the tubercle bacilli, is a bacillus-carrier and at times excretes tubercle bacilli, becoming thus a potential source of infection for the unprotected. This theory is in ac-

cord with the facts of animal experiment and explains as no other can, the practically universal dissemination of tuberculosis in civilized communities.

Now if Calmette is right, if the tropical experiences just detailed are correctly interpreted, what chance has the unprotected soldier, the potential primary case, to escape infection from his comrades in the close association of military life? Would not such infection have been communicated at the outset of the soldier's army experience? Have we need, then, to fear for him especially the conditions in France or in Germany? We know better than ever before how tremendously infectious the pneumococcus, the streptococcus, the influenza bacillus, the meningococcus are. The tubercle bacillus is equally infectious with these other bacteria, the conditions being equal. They are not, however, equal. Cases of active tuberculosis have been pretty thoroughly eliminated and we cannot suppose that the healthy bacillus-carrier is always a source of danger, nor that the bacilli that he may chance to excrete can reach their mark with the same ease as microörganisms carried habitually in the mouth or exciting disturbance in the respiratory tract. But, on the other hand, the opportunities of infection from the bacillus carrier are constantly present on every side, the dangers of infection are not in the least guarded against because they have not been understood to exist, and if such knowledge were imparted it is difficult to see what measures could be taken, how, for example, cooks could be obtained that are not bacillus carriers.

Now, if this view is accepted, what is to be expected? Is the primarily infected adult necessarily doomed to be attacked by an active and fatal disease? Not necessarily for it is altogether probable that the adult has the same power as the child to derive an immunity from a suitably proportioned initial infection with tubercle bacilli and something, not as much as we could wish, has been learned as to this from tropical observation.

Heinemann states that none of the 125 Javanese who reacted positively to the skin tuberculin test have fallen sick, which, however, may be because they had long ago developed an immunity as city dwellers. But when in Kamerun a group of 80 natives, men, women and children, from the hinterland were tested with tuberculin, only one man gave a positive reaction and he, it appeared upon inquiry, had been employed previously as a soldier on the coast. In the Belgian Congo and in Papua it was found that a certain proportion of apparently healthy natives—the greater the contact with the whites the greater the percentage—reacted positively to the skin test. Such individuals were evidently by way of acquiring an immunity just as our children are doing.

Epidemics of tuberculosis have been reported occasionally in the literature. These upon analysis are generally found to be merely a series of deaths from secondary tuberculosis which occur in a group of cases in some way closely associated, as when several individuals working in the same shop or lodging in the same house are stricken, one after another, in rapid succession. Sometimes such an event is doubtless to be explained

by the exposure of old cases of tuberculosis to identical bad hygienic conditions, at other times the bunching of deaths is probably due simply to a coincidence such as might be expected in so common a disease. Occasionally a dozen deaths from miliary tuberculosis follow one another rapidly in the same hospital to be succeeded by a period of many months in which no deaths from this form of the disease occur. Naegeli reports such an instance. Whether such an occurrence depends upon any deeper-lying cause than the depressing influence of weather conditions (in Naegeli's experience the deaths took place in the winter) upon a group of patients with already lowered resistance, is not known. At all events, we have here simply a hastening of the fatal issue in cases long infected with tuberculosis which can not be called an epidemic in the true sense of the word.

At Vancouver Barracks in the State of Washington, it was announced in 1912 that an epidemic of tuberculosis was raging. A considerable number of patients had been sent to Fort Bayard where it proved impossible to find any active tuberculosis in the great majority of them. The writer was sent to Vancouver Barracks to make an investigation. The view of the medical officers there was that new cases of the disease were being discovered every day, that the tuberculosis was spreading from man to man and at once becoming manifest and that the failure to disinfect barracks with sufficient thoroughness a few weeks previously was the cause of the alleged extension of the disease. The men supposed to have tuberculosis were, as a rule, without fever of importance and in fairly good condition except for a cough with purulent expectoration. We had then the singular situation that, on the one hand a dangerous infection was being widely disseminated and on the other that though the disease developed at once, its manifestations were obscure and its course chronic and benign—two series of epidemiological facts which were absolutely incompatible. Examination showed no discoverable tuberculosis and, as a matter of fact, as far as is known none of the cases diagnosticated as tuberculosis have ever developed the disease. The condition present was a bronchitis due to the streptococcus, a disease with which we have become more familiar since the war with Germany.

We can not have an epidemic of chronic, comparatively benign tuberculosis. The two ideas are incompatible; either there is no epidemic, or the disease is not tuberculosis. Epidemics of tuberculosis are impossible except in an unprotected population. If a chronic phthisis is believed to have developed from a recent infection, the conclusion is erroneous. Chronic phthisis is a disease of so slow a growth that by the time it becomes apparent, the history of its beginning has been lost. When chronic pulmonary tuberculosis seems to pursue a rapid course it is generally true that the disease has long been overlooked, that there have been many exacerbations before the final fatal illness.

Now if the disease which we are considering is in truth primary tuberculosis, what clinical course is to be expected? We have already seen there is reason to believe that a primary tuberculous infection of the adult need not become a manifest tuberculosis, that an immunizing vaccination

may be brought about if the initial dosage of the infection and the health of the individual permit. But if this fortunate result is not attained, the alternative is a fatal tuberculosis just as in the young child which has a manifest tuberculosis. Tuberculosis of the lungs which becomes clinically manifest in the first two or three years of life is a fatal disease, the chronic phthisis of the adult is unknown at that age for the very good reason that chronic phthisis is only to be found in the immunized individual. The alternative then, for the young child is immunizing vaccination from tuberculous infection or a manifest tuberculosis which is quickly fatal. Similarly if there are absolutely unprotected soldiers in our army, manifest tuberculosis will be for them a quickly fatal disease—there has been no time to develop an immunity worthy of the name during the year, or two years at most, that they have been with the colors. If the initial infection has been too large to be restrained by the awakening resistance, so that the disease becomes manifest within two years, its progress will be unchecked by aught else than death and the form that the disease takes will not be that of chronic phthisis.

We are so accustomed to expect a favorable issue and a slow course when tuberculosis declares itself in the immunized individual that we are unprepared for the fulminant manifestations when incipient tuberculosis becomes manifest in the non-immunized patient with primary tuberculosis.

Immunity is not only present in tuberculosis, says Much,[13] but in extent and strength is, perhaps, the greatest immunity that exists for any toxic organism. But this immunity is a plant of slow growth, it does not develop to its full stature in two years. We must expect then, if unprotected soldiers are present in our army in any considerable numbers, the epidemic prevalence of acutely fatal tuberculosis. This is the more certain because the aggregation of men in large numbers always facilitates the spread of infectious disease.

It will help to put this matter clearly before you if a few facts are given as to what happens to large numbers of tropical natives when brought in contact with the infections of civilization. Of the Marquesas, Buisson[14] says tuberculosis is very widespread and has depopulated many valleys. "When the malady attacks one of the unhealthy huts where swarm pell mell eight or ten, even twelve or fifteen persons, it is quickly emptied. In less than two years, sometimes in one year, the house is empty, all its inhabitants are in the cemetery." Meyer speaks of the devastating effect of tuberculosis in Yap in the German West Carolinas. A census shows the older people in the majority, some of the years of youth are not represented at all. The young people have melted away in the last few years from tuberculosis, having also been carried off in part with dysentery. In Queensland the Polynesians represent but two per cent. of the population but furnish 22 per cent. of the mortality from tuberculosis. In 1803 and 1810 the British Government imported some three or four thousand negroes from Mozambique into Ceylon to form regiments. Of these there remained in 1820 but 440 including male descendants. According to Calmette an English speculator once intro-

duced 2000 natives of the Marquesas at Lima. Three-fourths of these were dead of tuberculosis in less than 18 months.

The number of deaths reported in the Army from September, 1917, up to May 1, 1919, from pulmonary and miliary tuberculosis is 1220. The average strength of the army being computed as 2,121,396, this gives a death rate of 575 per million for the whole period. Since tuberculous cases are kept in the service after their organizations are demobilized the deaths have really occurred in a strength of over three million men, so that the rate just given is too high. On the other hand some tuberculous patients have been discharged who have since died or will die of their disease—the rate would be somewhat increased on their account, if there were any possibility of determining just what their number is. The figures given are therefore only a very rough approximation to the actual facts. But they at least serve this purpose: they show that there has been no epidemic of tuberculosis among our soldiers.

The number of cases of tuberculosis detected in the examination of 1,627,265 men for demobilization from November, 1918, to April, 1919, inclusive, numbered 819, or 503 per million. This very small number is sufficient evidence that infection during army service is at least a negligible factor, if it occurs at all.

If we contrast such results as these with the mortality from epidemics of primary tuberculosis in groups of really unprotected individuals who are exposed to the opportunities for massive infection we will be convinced that our soldiers are not in danger of contracting primary tuberculosis, that they possess an immunization against the disease comparable to that of the other members of civilized races.

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DISCUSSION ON PAPER BY COLONEL BUSHNELL

Dr. Lawrason Brown, Saranac Lake: I do not know whether Colonel Bushnell was trying to prove only that acute or primary tuberculosis does not occur in the army, or whether that there was no adult infection in the army. I don't know whether that is synonymous in his mind or not. There are so many interesting things that he mentioned, that I can only refer to one or two of them.

In the first place, I think when he spoke about figures in the various reports being too few, he is absolutely right. But there was one other fact of possible error in those cases, and that is, these different men may have interpreted different things as being tuberculosis. Hodenpyl brought that out some years ago in his work on thickening of the pleura, showing many pleural changes which had been classified by a number of men as non-tuberculous to be tuberculous. By accepting such work we can get a much larger number of tuberculous conditions.

In the second place, what he said about glandular involvement we know is true. Koch's classical animal experiments showed this. I think everybody has understood that point, as far as I can see, for a long time.

In regard to pulmonary tuberculosis, I have always looked on that condition as a secondary, not a primary, infection. The only question which has to be considered is whether the secondary infection is located in the lung, because pulmonary tuberculosis is an infection either from within or from without. I should like to ask Colonel Bushnell if he has considered that possibility in these figures.

Dr. James A. Miller, New York: I think that Colonel Bushnell has rendered us a very real service in having brought this matter before us. I think we have been, as he said, accustomed to break loose from the moorings of sound basic facts in tuberculosis. What he has said to-day and the figures which he has given us on the army will start many of us thinking. It is certainly beyond my power to dispute the suggestive deductions which he draws from those figures at the present time. I think, however, they open up a new line of thought which may be of real value for a better understanding of tuberculosis. I feel that we all owe a very great debt to Colonel Bushnell.

Col. Gerald B. Webb, Colorado Springs: There was a wonderful opportunity in the American Expeditionary Forces for postmortems, an opportunity which was not offered on this side. I am sorry to say that full advantage was not taken of that opportunity. As I saw postmortems in the different hospitals I was very much struck with the neglect of the men to look for tuberculous lesions. Each man seemed to have a hobby of his own. One man was interested in the infections of the sinuses; another man, in the bacteriology of the wounds. I asked each man to make a careful note of all tuberculous lesions in general. There were very few to be found after careful searching. At the central laboratory at Dijon, which was practically the head of the pathological branch of our army, I asked the Commanding Officer to give me the names in the American Expeditionary Forces of some pathologists, especially those who would be conscientious in the investigation of tuberculosis autopsies. They gave me the names of three or four men. In my visits to the different hospitals I finally sought these men and found that one or two of them had had tuberculosis. They were exceptionally keen about looking for every possible lesion. The results that Colonel Bushnell has so well told you about, I was largely instrumental in getting together and bringing back to the Surgeon General's Office. It is perfectly true that enough cases are not

recorded, but all told, probably one can be thoroughly authentic on upwards of 2000 postmortems that were made in the Expeditionary Forces. The general conclusion was reached by men working independently of one another, that it was exceedingly rare in the bodies of our men to find tuberculous lesions.

I think all of us have enjoyed hearing Colonel Bushnell. I remember reading some years ago his article on the lack of infection in adult life, based on cases in the army. It was because of this article that I was more interested in this condition in France. There were, during the ten months I was in France, about 300 deaths in the A. E. F. from rapid forms of tuberculosis. From the clinical point of view some very interesting things came out. For instance, we sent more men back to Kentucky for tuberculosis than to Massachusetts. We sent more men back to Texas than we did to Pennsylvania. Our figures were, of course, small. But the way it impressed me was this: We have had few reports on tuberculin tests in our country districts. No one has ever, I believe, in country districts found a positive reaction. They have in the city. I think it is very well known that the ratio of infection bears a distinct relation to the opportunity of more or less crowding.

In the army, for the first time in history, I believe, the country boys were submitted to postmortem examination on a vast scale. The reports of Naegeli, whose work we are familiar with, come from cities like Vienna and similar places, which we know to be crowded, and also crowded, of course, with tuberculosis. So we have here a new factor, possibly, which might in part explain the situation. The colonel's points are exceedingly well taken, and it is perfectly true that there has been no great epidemic of pulmonary tuberculosis. But it was the impression, I think, of many of the pathologists who went to France that possibly we could not yet accept the view that 75 per cent. of our army as such are protected against tuberculosis, because these figures were certainly lacking.

Dr. Maurice Fishberg, New York: We are under great obligations to Colonel Bushnell for the methods he applied while handling the problems of tuberculosis in our army during the trying period of the war. He apparently started with the modern conception of tuberculous infection and immunity, that nearly all adults have been infected at some period during childhood, and that this infection has immunized them against renewed exogenic infection with tubercle bacilli. Bear in mind that if our soldiers had not been inoculated, or in some other way immunized against tuberculosis, we should have seen an actual epidemic of tuberculosis when over five million men are brought together under adverse conditions. Just note the experiences of cattle breeders when they bring one tuberculous cow into a stable—all are infected within a short time. In fact it has been observed that a cow with no visible lesion is apt to infect an entire herd of cattle which have never before come in contact with tubercle bacilli.

We know that tuberculosis is a highly transmissible disease when introduced among humans or animals which may be considered "virgin soil." It is as contagious as influenza which we saw last winter attack

the population of a region, hardly sparing any one, excepting those immunized by a previous attack. Similarly tuberculosis acts when introduced among primitive peoples, who have not had the benefit of previous mild infection during childhood.

Those of us who attended the meeting of the National Association two years ago will recall that apprehension was voiced that our soldiers might become infected in large numbers; in fact, that we might expect an epidemic of tuberculosis among them if the draft boards were not careful in the selection of recruits. Indeed many people were, because of these warnings, more apprehensive of tuberculosis than of German bullets. Reports from France seemed to point in this direction.

Some six years ago I made an investigation as to the dangers of transmission of tuberculosis from adult to adult. I had a splendid opportunity for such an investigation, being the physician to a large charitable society which cared for about one thousand dependent consumptives annually. These tuberculous people lived in the most squalid surroundings of the tenement district of New York City. In some cases the husband, in others the wife was tuberculous. In the vast majority of cases the sick and the healthy consorts slept in the same room; in over 50 per cent. they shared the same bed. Now picture to yourself such conditions in which people affected with influenza, typhoid, typhus, or syphilis shared the same room or bed with the unaffected. How many wives of syphilitic husbands remain unaffected? How many, not previously immunized by a previous infection, were spared by "typhoid Mary"?

But among the 270 couples one of whom suffered from active tuberculosis, I found that in less than three per cent. of the cases was the consort also affected with active disease. Now, we should expect among the average population that between six or seven per cent. would be tuberculous. It is thus clear that among these tuberculous persons the ratio of infections was less than would be expected without any special exposure.

If a tuberculous husband cannot transmit the disease to his wife, and a tuberculous wife cannot transmit the disease to her husband, as the facts just cited prove, it is evident that we need not fear that tuberculous soldiers should infect their comrades. How often do those of you who have large numbers of tuberculous patients in sanatoria find that both husband and wife are admitted to your institutions for treatment? Very rarely. Examine carefully the husbands of your tuberculous patients and you will be surprised that, although they came in contact with the tuberculous consorts, they remained unaffected.

It is facts such as these that permitted a sane handling of the tuberculosis problem in our army. Colonel Bushnell just showed that the number of soldiers who acquired the disease while serving their country was extremely small. I wish that this lesson might be carried home so that no tuberculous patients need be persecuted, no families broken up, no poor devil with an inactive lesion deprived of his livelihood by being prevented from working because of the chimerical possibility of his infecting fellow workmen.

Colonel Bushnell: Dr. Brown asked if there is infection of one adult by another. I do not believe that there is in our civilization. With a native of the tropical jungles who has had no previous contact with tuberculosis however, the case is a very different one. There is a good deal of talk of the infection of adults with tuberculosis, but the cases alleged do not compel the acceptance of the idea of a recent exogenous infection. Whatever our views as to the pathology, practically we all act as if there were very little danger of such infection—we do not act with tuberculosis cases as we would with influenza or typhoid fever. The question as to infection is, then, with us a theoretical question, and as a matter of fact we do not have any trouble from so regarding it. Dr. Brown also spoke of the criteria by which the pathologist is guided. This is an important point which I mentioned in my paper but did not have time to enlarge upon. Of course, if one man has a certain set of criteria by which he judges a lesion to be tuberculous and another has an entirely different set, the results of the two men cannot properly be compared. Much might be said as to the interpretation of lesions. I think the more liberal interpretation is more likely to be the correct one because it agrees with our other data as to the incidence of tuberculosis. Naegeli when he began his investigations found about 40 per cent. in his autopsies. With greater practice his percentage gradually rose until in his last series he had 97 per cent. to 98 per cent. of positive cases. Naegeli and Burkhardt used the miscroscope in their work. The medical officers of our army in France probably did not. Their results cannot properly be compared with those of Naegeli and Burkhardt on that account. At the most, we should not expect a higher percentage than 40 per cent., like that of Naegeli's first series. I quite agree with Dr. Brown that the acceptance of Koch's fundamental experiment should make a great deal that I have said unnecessary. At the same time experience shows that it is necessary to call attention repeatedly to this experiment because many of us make no use of it in our thought. It is a fact, not a theory, that the animal infected with tuberculosis upon reinfection acts very differently from the primarily infected animal. Now, I say that we should use this fact as one of the stones of our foundation, and that it is better to begin to build even though we may be compelled to pull down a part of that which we have built, than to sit around and not build anything.

As for reinfection, I do not believe that any organism that has had time to acquire a certain immunity from tuberculous infection can be successfully reinfected, except by a massive reinfecting dose. But you cannot have a massive exogenous reinfection unless it is artificial. It is true that if a large quantity of tubercle bacilli are injected subcutaneously there will result a local lesion to which there is a certain reaction, what Ranke calls the reaction to foreign bodies. It looks like a tuberculous focus, but it is a local lesion, not an infection because it does not extend. One thing that I should very much like to see done on a large scale is the testing of our population with tuberculin to determine its degree of tuberculization, to determine whether there is any considerable percentage, in fact whether there is any percentage at all beyond early childhood that

has not come into contact with the tubercle bacillus and hence is in danger of a primary tuberculous infection. The test should be made with the cutaneous reaction to old tuberculin undiluted, repeated if necessary, and followed in the negatively reacting cases by the subcutaneous use of tuberculin and the complement binding reaction to tuberculosis antigens. We have just had 100 men examined by the cutaneous test at Spartanburg. The results, as I recall them, were 94 per cent. positive to the cutaneous test. Of the six who reacted negatively three failed to appear for further tests. The blood of the remaining three all gave a positive complement binding reaction to Petroff's antigen. These were enlisted men of the Medical Department, largely boys from rural districts in Georgia and the Carolinas, the class of men supposed to be in danger, yet nearly, if not quite, 100 per cent. were positive to tuberculin. But I must correct that statement. Some of those tested were doctors and nurses. I think about 50 per cent. were enlisted men. How about that, Major?

Major Walter H. Watterson: I think 70 per cent.

Colonel Bushnell: The statement that 75 per cent. of our soldiers are in danger of primary tuberculosis is sufficient ground for an investigation to see what the facts really are. I theorize and say that the facts are such and such. Colonel Webb theorizes and says that they should have a different interpretation. Let us have the matter decided, not to justify Colonel Webb or to justify me, but for the good of humanity.

MEDICAL, HOSPITAL AND SOCIAL ASPECTS OF RECONSTRUCTION FOR THE TUBERCULOUS*

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Vocational training or reëducation of disabled men in military service was first intended to prepare them for return to military duty, in branches of service in which the work was not severe, such as, telegraphy in the Signal Corps; photography in the Aviation Corps; automobiling in the Motor Transport Corps; typewriting and business courses for the Quartermaster Corps.

After the armistice, vocational reëducation had for its purpose the fitting of men who were disabled by the war for new occupations in civil life. Vocational restoration for orthopedic and cardio-vascular conditions has resulted in much good for these disabilities. It is apparent at once, however, that vocational restoration cannot be reached in the tuberculous, as the original function of the lung with extensive fibrosis or destructive process with cavitation can hardly be restored to its physiological function. It is essential, however, that we get the subject of reconstruction as it applies to tuberculosis, standardized as to purpose and method. The primary purpose in the treatment of tuberculosis is to arrest the disease and to cure the sufferer. With this end in view, we must consider what phases of reconstruction are applicable in tuberculosis hospitals. It appears from our observations that vocational reëducation has a rather limited place in these hospitals.

Occupational therapy, however, seems to offer a valuable help from the standpoint of curing the patient. It is a therapeutic measure. Vocational reëducation is an economic measure that should be largely considered only after a tuberculous patient has reached a point of security against a reactivation of his tuberculous condition. Is it feasible to hold patients in the sanatoria, or should the gap between sanatorium treatment be bridged over for those who need vocational reëducation, so that a new favorable occupation that will not tend to reactivate their condition be given. Captain Frank A. Waugh, Sanitary Corps, U. S. A., suggests that treatment should be given in special reconstruction towns or communities. He outlines the following considerations:

1. With the purpose of bridging over the gap between sanatorium treatment for tuberculosis and full return to industry, it is proposed to establish special communities.

2. A firm economic foundation must be found in some industry or

* This paper with accompanying illustrations has been published in the October number of the *Journal of the Outdoor Life.*

group of industries carefully organized and controlled to meet the special needs.

3. Proper medical supervision would of course be necessary; but whereas medical treatment would have first place in the sanatorium, productive industry would take precedence in this reconstruction community.

4. The family unit should be preserved.

5. Such a community might eventually become self-supporting, but at the outset it would require substantial financial assistance.

6. Location upon the lands of the national forests has been suggested as providing (a) inexpensive land (b) a basis for attractive wood-working industries and (c) permanent control of land holdings.

Captain Waugh, who has first suggested the use of National Forest Reservation for this purpose, has given a great deal of thought to this subject, and it is expected that he will publish a paper very soon explaining in detail the possibilities of this scheme.

What are the medical aspects of occupational therapy? We have been taught that rest, food and fresh air are the three essentials in the treatment of tuberculosis and so much stress has always been made upon rest that I was somewhat opposed in the beginning towards anything that would interfere with rest, but as Colonel Bushnell has shown us, there is a fourth great factor in the treatment of tuberculous cases and that is the psychical treatment which he has insisted should be carried out in all the Army hospitals and which has been a great help towards making these soldiers who have been away from home a long time, more contented to remain in the hospital for the treatment they need. The combination of occupational therapy associated with the periods of complete relaxation, as suggested by Colonel Bushnell, I believe will bring a much better result from treatment than we have been accustomed to getting in the old way. A patient undoubtedly can be taught to relax completely if the medical officer will carefully explain the benefit to be derived from such relaxation.

The mental side of the patient is something that has been very much neglected. The brains of some of these men are very, very active. It is important for the man to forget the process going on in his lungs and divert his mind by some light occupational exercise which will not only interest him, but will exercise his mind without throwing any increased burden on the pulmonary disease. Anything that will favorably affect the psychology without throwing the burden on the lungs, I believe, is most excellent medical therapeusis and should be a part of the essential treatment of tuberculosis. It has been found that 85 per cent. of these patients can do some form of occupational therapy and it has been thought that 100 per cent. enrollment can be made, but I think there are some acute and moribund cases to which it is inadvisable to apply occupational therapy. We have suddenly come to regard occupational therapy as a most valuable aid to the rest cure in these hospitals. The patient, after his mind has been directed towards something outside of his chest, will much more easily take a period of complete relaxation. This work to be success-

ful must be under the immediate and complete control of the medical officers who should take interest enough properly to prescribe the type and amount of therapeutic exercise to be taken. This should be done on a prescription blank the same as you would prescribe any other therapeutic measure.

What are the hospital aspects of occupational therapy? I do not know how familiar the general public is with the difficulty encountered in attempting to hold soldiers, especially those who have been overseas, to treatment away from home on their return to this country. They are all anxious to return home and take their chances no matter what their condition. I have been in hospital work many years and have experienced the usual difficulties in holding patients to treatment, who come into sanatoriums by their own desire for a long enough period to secure the maximum amount of benefit from treatment. We are all familiar with the desire of patients to return home about as soon as their temperature subsides and their weight returns to normal, regardless of whether their disease may be active or inactive. If you were to place five hundred of these soldiers in a civil sanatorium under the régime with which we are all familiar, no organization would be able to control them or keep them contented at all. Therefore one of the greatest points in the hospital aspect of occupational therapy is that of contented control. It is a great help in the administration of the hospital. Therefore, from a hospital aspect, I am very sure from my observation thus far, that occupational therapy will make every patient in all types of hospitals, more comfortable, happier, and will improve the morale of the entire patient personnel, even though some of them may not be taking any of the therapeutic exercises.

I shall not speak in detail of the types of therapeutic exercises, but will give you a list of the types of handicraft work used in the United States Army General Hospitals:

Practical Industries
- Gardening
- Poultry keeping
- Automobile repair
- Telegraphy
- Photography
- Wood-working

Business Subjects
- Typewriting
- Stenography
- Bookkeeping
- Business English
- Business arithmetic

General Subjects
- Reading, writing and spelling for beginners
- Reading, writing and spelling for foreigners
- Advanced English for foreigners
- Arithmetic for beginners
- Civics, or American government for foreigners in preparation for naturalization
- Spanish
- French
- Drawing and mapping

Crafts on Wards
- Basketry
  - Raffia
  - Pine needle
  - Reed
  - Splint
- Book binding
- Bead work
- Block printing

Brush making
Chair caning
Colonial mat making
Crocheting
Drawing
Designing
Embroidery
Knotting
Lace making
Leather work
Lettering
Metal work
  Etching
  Pierced work
  Jewelry
Modelling
Painting
Rake knitting
Sign painting
Stenciling
Textile weaving
Toy making
  Wood
  Tin
Wood work, varied
Wood carving

What are the social aspects of occupational therapy? It seems to me the greatest social value of occupational therapy is the schoolroom work, that is of giving these men some educational instruction while they are in the hospital and where the period of treatment is of sufficient length of time so that something may be accomplished. In hospitals in which a considerable number of patients will be found who do not read and write, especially if they are American born, it is more or less of a tragedy to a patient, so far as their making a living is concerned. For the foreign born it is one step towards Americanization and naturalization. The government feels that it owes a special duty to the alien soldiers who composed a large part of our Army. There were found to be many illiterates. The Americanization classes started by Captain Waugh of this hospital aroused a great deal of enthusiasm among the patients and a great deal has been accomplished along this line. The Surgeon General's office saw fit to issue a special bulletin commending the work of Captain Waugh at U. S. Army General Hospital Number 16, New Haven, Conn., and they recommended that the work being done at this hospital be adopted in the other hospitals.

I believe that occupational therapy has a social aspect in the management and treatment of patients in all types of hospitals, in reformatories especially for girls and boys, in insane hospitals, and in almost every type of institution with the exception of homes for feeble-minded, where it has been found that it makes little difference whether you occupy the mind of the individual or not, with other than routine physical work. I can easily picture the use of occupational therapy in a general hospital and even though the patient may have a broken leg and remains in the hospital for a few weeks only yet I am sure that he will be better off by the psychical effect of occupational exercise.

It is suggested that all large hospitals have a reconstruction service under the management of a competent director who is perfectly familiar with therapeutic and occupational exercise. Most hospitals can begin this work in a small way and it is recommended that hospitals secure a trained reconstruction aide or in a large general hospital two or three aides for they can soon train patients who are well enough, so that they can soon teach the others. A much better scheme will be to give all nurses

a three months' period of training in reconstruction work so that it can be entirely under the guidance of the nursing staff thus avoiding friction between two groups of women workers in a hospital. I believe, if the work is once commenced with small handcrafts, and especially with a schoolroom and educational features, that very soon it will be quickly extended and will be placed on a sound medical and hospital basis as a routine part of the treatment of the majority of patients.

The hospital care of patients in the future will probably center about the individual more than it has in the past. It must not neglect the external factors that play upon and affect the individual's life. It must include in its scope a most complex phase of social environment that has been neglected by medical officers in the past few years. It is impossible to deal effectively with tuberculosis and many other health problems without being confronted with the problem of poverty. Education will do much to correct the difficulty. Therefore, groups of illiterate patients should be given the maximum amount of educational instruction.

TUBERCULOSIS AMONG EUROPEAN NATIONS AT WAR

By JAMES ALEXANDER MILLER, M.D.

New York

INTRODUCTION

The impulse to renewed activity furnished by the war and the consequent readjustments of old ideas to meet the unprecedented conditions are perhaps nowhere more important than in the field of preventable disease.

Among the preventable diseases, tuberculosis has always played a leading rôle and from the campaign against it many of the fundamental principles of public health have been developed and applied widely to other diseases.

Before the war, however, it may truthfully be said that in America, at least, further progress toward the prevention of tuberculosis has been increasingly difficult and we have, therefore, watched with some concern the effect of the more brilliant results attained in other diseases which has tended to create a comparative diminution of the professional as well as public interest in the tuberculosis problem.

Explanation of this phenomenon is not lacking. Acute disease with short incubation period and rapid termination lends itself to accurate knowledge of the varying factors in causation, prevention and treatment. Results of successful efforts against such diseases are consequently more striking and more dramatic than could ever possibly be the case in a chronic infection such as tuberculosis, short of anything but an absolutely specific method of treatment which we as yet entirely lack.

In tuberculosis the more obvious and less difficult methods of procedure have now been in operation for some years and have become commonplace. Recent years have developed no striking new facts and the cream of the interest as well as, perhaps, of the progress along old lines had been obtained, and consequently we had begun to find the anti-tuberculosis campaign settling down to a rather humdrum, uninspiring routine, enlivened only by the muttering of criticism. This criticism is already, in some quarters, beginning to take shape as an insistent demand for a reconsideration of all the evidence, with the idea that an unprejudiced investigation of the actual results obtained might justify a complete reconstruction of accepted notions.

Into this rather drab atmosphere in which those of us particularly interested in tuberculosis were beginning to find ourselves, the crash of world war has come with its upheaval of accepted habits, the loosing from many of our traditional moorings and the urgent call for quick

readjustments in thought and action to save the very foundations of society.

The small part which the members of the Commission for the Prevention of Tuberculosis in France have been privileged to play in this momentous drama has been along conventional lines but with its interest heightened because of the vivid setting in which the scene has been laid. The task, therefore, which I have set myself at this time is to summarize some of our experiences with tuberculosis under the unprecedented conditions of war and to attempt to analyze these facts so that perhaps some lessons or, at least, suggestions of value may be elicited. Thus, perhaps, a hackneyed subject may absorb new interest from the vividness of its surroundings and so unromantic a subject as tuberculosis may share in the new spirit and new knowledge which we feel must be born into the world to help compensate for the fearful price which has been paid.

The sources of information at our command lend themselves to the purpose in mind. Our special field of activities being laid in France, our knowledge of conditions in that country is of course particularly complete and is peculiarly interesting because of the fact that modern methods of control of preventable disease have been in the past remarkably deficient for a nation which has contributed so much to the development of scientific medicine. This fact, however, throws valuable light upon the effect of such a short-sighted policy upon the incidence of tuberculosis, and also, now that finally a vigorous modern public health program is in a fair way to be established, the results should be more striking and the relation between cause and effect in such a program should be more susceptible to critical analysis than is possible in countries like our own where the campaign for better hygiene has been a more gradual development.

In addition to France, however, our contacts have supplied some valuable though less complete information of conditions existing in Great Britain, Belgium, Germany, Austria-Hungary and Servia. This, with also some consideration of the situation as it affects America, will be included in the present discussion.

The influence of the war upon tuberculosis problems falls into two general catagories, first in the armies and secondly among the civilian populations.

TUBERCULOSIS AND THE ARMIES

The French Army.—It was the cry of alarm in reference to tuberculosis in the French army which first attracted serious attention to the possible great importance of this disease as a factor in army problems. It was Professor Landouzy who first voiced this apprehension with his estimate of 150,000 cases of tuberculosis in the French army. This unfortunate exaggeration has been widely quoted and quite generally accepted as representing the danger to French military efficiency from this source and by inference, therefore, to the armies of other nations as well.

In the light of this startling first impression the results of subsequent investigations are peculiarly interesting.

In December, 1917, M. Godart made public in the French Senate the fact that the total number of soldiers discharged from the French army from August 2, 1914, to October 31, 1917, was 89,430. Of these 70,196 were discharged previous to March 1, 1916, and represented largely cases of preëxisting tuberculosis caught into the army by the urgently rapid mobilization without proper medical examination and in consequence in no way dependent upon the influence of army life for their development. Consequently from March 1, 1916, to October 31, 1917, the number of such cases was only 19,134 which may be taken as the truer indication of the amount of tuberculosis actually developing in the army during active service. Moreover, M. Godart stated that subsequent careful reëxamination of these discharged soldiers revealed the fact that a very large percentage of these cases were erroneously diagnosed and Professor Emil Sergent and Major Edward Rist, who have personally examined several thousand of these cases, estimate that the proportion of such faulty diagnoses may reach the astonishing total of 40 per cent. of all.

The exact size of the French army is not public knowledge so that accurate estimate of the meaning of these figures in percentages is not possible, but it certainly could not have been less than 4,000,000 men the first months of the war or less than 3,000,000 in the later period after March 1, 1916. Upon this basis and accepting the higher figures furnished by M. Godart as official, without consideration of the tremendous reduction which would result from the acceptance of the estimates of Messrs. Sergent and Rist, we may estimate that the maximum amount of tuberculosis necessitating discharge from the army was 1.75 per cent. in the early months of the war, when, according to general knowledge, large numbers of active cases of tuberculosis were mobilized and .63 per cent. in the later months of the war after such cases were probably largely eliminated.

When we compare these figures with the results obtained in America through the medical examinations for our own army as published by Colonel George E. Bushnell, we find that an average of .78 per cent. were rejected for tuberculosis. This indicates not only that the tuberculosis situation in the French army was grossly exaggerated but also that the number of cases developing in the army during active service is not greater than that found in a similar group of men taken from civilian life in America. Further corroboration of this point of view has reached us from various sources, and with no exceptions the physicians and surgeons of the French army with whom we have discussed this subject state that in their experience the physical condition of the men is much better than among similar groups who have been mobilized into industry or than it would have been in their normal civil life, and numerous examples of early or latent tuberculosis becoming arrested after two or three years of military service, have come to our knowledge.

The British Army.—We have sought for similar evidence from the experience in the British army and through the courtesy of the war office and of the statistical department of the Medical Research Committee, we have secured some interesting data.

The case sheets of all sick and wounded in the British army are filed with the Medical Research Committee, whose statistical department is engaged in an analysis of them. Up to the present time only the records up to December 31, 1915, have been systematized in such a way that the desired information is available. Dr. Young of this department very kindly went over the records and furnished the following figures.

Total number of medical case sheets, August, 1914, to December 31, 1915	400,000
Number of cases of wounds	130,385
Total number of medical cases excluding wounds	269,615
Total number cases tuberculosis excluding glands	3,575
Total number cases pulmonary tuberculosis	3,020
Total number cases other forms tuberculosis excluding glands	555

From the above figures it is shown that tuberculosis forms 1.3 per cent. of the whole number excepting wounds, and pulmonary tuberculosis 1.1 per cent.

From the British war office evidence from another angle was obtained. The number of soldiers discharged for tuberculosis during the war not being available, we took the total number of hospitalized soldiers in Great Britain upon a given day and compared it with conditions before the war with the following result.

On April 30, 1918

Total number hospital cases in United Kingdom	263,000
Total number cases excluding wounds	137,000
*Total number cases pulmonary tuberculosis	1,264
Percentage of pulmonary tuberculosis	.92%

From the same source we obtained the similar figures for peace times. It appears that the percentage of pulmonary tuberculosis in the British army has been almost a constant factor for 15 years so that the curve of percentage of hospitalized cases found tuberculous is practically a flat one at 1.1 per cent. The average total number of such hospital cases before the war being from 4000 to 5000.

It also appears that the average number of cases discharged from the British army over a number of years before the war was 1.31 per cent.

From these figures, incomplete though they are and probably containing errors incident upon the extraordinary difficulty of maintaining accurate war time records, it would seem justifiable to conclude that the conditions of the present war have not tended to increase the percentage of tuberculosis in the British army.

The Belgian Army.—The Inspector General of the Service de Santé of the Belgian army has very kindly supplied us with information concerning tuberculosis before and during the war.

The average number of cases discharged for tuberculosis before the war was 163 a year. The average army strength during the same period was 46,000 men. This gives an incidence of pulmonary tuberculosis of .35 per cent. per year.

Since the beginning of the war up to October 15, 1918, the total number of cases of pulmonary tuberculosis discovered in the army has been

*Of these 680 cases developed in France, 477 in the United Kingdom, 32 in Mesopotamia, 22 in Egypt, 13 in Italy, 10 in Salonica, 3 in Africa and 27 from all other sources.

2099. The statistics according to each year are not available but this figure would give approximately 525 cases a year.

The average number of effectives in the army during this time was 200,000 men. This gives an incidence of .26 per cent. per annum which is only 75 per cent. of the pre-war experience.

It is thus shown that Belgium, with an extremely low incidence of tuberculosis in its army before the war, nevertheless has had this rate very distinctly lowered during the war.

The American Army.—When we turn to the short and necessarily inconclusive experience of our own army, we find that tuberculosis is not proving in any sense a large problem. This is very probably due to the extraordinarily efficient methods employed in the examination of recruits and later of the troops in the cantonments. These examinations, as already stated, showed a percentage of .78 cases discharged for pulmonary tuberculosis, which figure must be taken rather of the incidence of this disease among civilians of the age group from which our army was recruited, rather than in any sense an index of the influence of army life.

The protection against tuberculosis afforded to the fighting forces by the systematic elimination of active or latent cases through careful examination is shown by the fact that only a few hundred cases of pulmonary tuberculosis have developed among the American troops in France, so that this disease was never a serious problem there.

Table I shows the relative incidence of pulmonary tuberculosis in the various armies before and during the war and the results of examinations of a large portion of our own army.

Effect of Asphyxiating Gas and Chest Wounds

Another interesting medical question which affects all the armies is the effect of gas warfare and of chest wounds upon the subsequent development of pulmonary tuberculosis. It appears to be definitely proven that, contrary to expectations based upon currently accepted notions,

TABLE I

Tuberculosis in the Armies

Army	Period and Unit	Percentage of Tuberculosis
France	Early months of war	1.75
France	Last two years of war	.63
Great Britain	Before the war. Entire army	1.1
Great Britain	First 17 months of war. Entire army	1.1
Great Britain	Hospital cases, April 30, 1918	.92
Belgium	Before the war. Entire army	.35
Belgium	During the war. Entire army	.26
United States	Regular army, 1917–1918	.75
United States	Officers' Training Camps	.27
United States	17 Divisions National Guard	1.09
United States	National Army	.67
United States	Entire Army, 1,406,498 men	.78

pulmonary tuberculosis does not often develop as a result of these severe mechanical irritations of the respiratory tract.

From all of the sources available to us it therefore seems entirely justifiable to conclude that tuberculosis has not been increased because of the influence of this war upon the armies in the field and that if anything the effect of army life is to diminish the hazard from pulmonary tuberculosis.

For any effect of the war toward the increase of tuberculosis we must look to the conditions among the civilian populations.

CIVILIAN TUBERCULOSIS

In France. In France the tuberculosis situation among the civilian population is truly a serious one; it is not, however, widely distributed throughout the country as high mortalities are found in the cities, while the rural sections are comparatively low, excepting in Brittany and Normandy where special conditions exist.

It is also surprising to find that, statistically at least, the war cannot be proven to have materially increased the tuberculosis death rate. This is shown in Table II of comparative mortalities before and during the war in the City of Paris, where very complete records are available, and for 13 representative departments of France in Table III the data for which for the years 1912–1916 have been collected with some difficulty by our Commission. It must be remembered, however, that all mortality rates are based on 1911 census figures, which the large number of as yet unreported military deaths and the very marked redistribution of the population, due to the war, render of little value as a present-day basis.

I have already had occasion[1] to describe the social conditions in France which appear to have their influence upon the tuberculosis problem which in brief may be summarized as follows: (1) A problem of tremendous and often shocking overcrowding in the larger cities due to the influx of refugees from the invaded districts, the unprecedented development of war

TABLE II

Deaths from Pulmonary Tuberculosis in Paris of Residents and Non-Residents during the Years 1912, 1913, 1914, 1915, 1916 and 1917*

Years	Deaths from Pulmonary Tuberculosis			Rate per 100,000 Inhabitants Resident of Paris
	Residents of Paris	Non-Residents of Paris	Total	
1912	9525	1251	10,776	332
1913	9208	1229	10,437	328
1914	9359	1439	10,798	328
1915	9091	1377	10,408	319
1916	8756	1458	10,214	307
1917	8424	1652	10,076	295

* From the Weekly Bulletins of the "Statistique Municipale de Paris."

[1] American Review of Tuberculosis, 1918, ii–409.

TABLE III

France—Tuberculosis Mortality[1]—Deaths from Tuberculosis of all Forms in Thirteen Departments during the Years 1912, 1913, 1914, 1915, 1916

Departments	Population in 1911	1912		1913		1914		1915		1916	
		Tuberculosis Deaths	Rate per 100,000	Tuberculosis Deaths	Rate per 100,000	Tuberculosis Deaths	Rate per 100,000	Tuberculosis Deaths	Rate per 100,000	Tuberculosis Deaths	Rate per 100,000
Alpes (Hautes)	105,083	88	84	96	91	101	96	83	79	58	55
Galvados	396,318	983	248	922	233	1170	295	1222	308	1112	281
Cantal	223,361	200	90	208	93	187	84	224	100	217	97
Côte d'Or	350,044	372	106	378	106	419	120	428	122	419	120
Creuse	266,188	387	145	332	125	324	122	449	169	367	138
Isère	555,911	988	178	876	158	803	144	839	151	901	162
Loir-et-Cher	271,231	386	142	394	145	382	141	381	140	371	137
Pyrénées (Hautes)	206,105	303	147	290	141	338	164	318	154	258	125
Pyrénées Orientales	212,986	266	125	379	178	261	142	271	127		
Savoie	247,890	310	125	273	110	277	112	221	89	357	144
Savoie (Haute)	255,137	424	166	418	164	442	173	379	148	400	157
Sèvres (Deux)	333,627	447	132	423	125	452	134	502	149	433	128
Seine (Paris and suburbs)	4,154,042	16,871	406	16,627	400	17,021	410	16,487	397	15,825	381
Total for the 13 departments	7,581,923	22,025	290	21,716	286	22,177	292	21,804	288	20,718	281

[1] Compiled from correspondence with the "Préfets" of these Departments by G. J. Drolet, Statistician, Commission for the Prevention of Tuberculosis in France.

industries in these centers and the total lack of new housing construction since the beginning of the war; (2) the excessive industrial pressure which has drafted thousands of women especially into unaccustomed industry and usually under the most unfavorable hygienic conditions of long hours, excessive strain and special hazards of the working environment itself; (3) the prolonged physical and mental strain incident to the war nowhere more noticeable than in France and (4) excessive alcoholism in such cities as Paris and Marseilles and certain country districts as Brittany and Normandy.

In spite of the fact of the figures, however, it may be said that the general impression of physicians in dispensary work in France, including our own, is that there actually exists a relative increase in tuberculosis in France especially among younger women which would seem to depend especially upon the continuation of untoward housing and industrial conditions above noted. Whether this is actually true, however, can only be demonstrated later after more accurate records are available.

It is both interesting and important to note that there has been no real problem of undernourishment in France. Food in general has been sufficient and available to the working classes because the higher prices have been offset by the correspondingly higher wages. During the past few months, however, food conditions in France have been unsatisfactory for the first time and we are beginning to see evidences of it in a more general malnutrition among dispensary patients than formerly. If continued, this condition will undoubtedly lead to serious results.

Our commission is instituting a study of the food factor in the development of tuberculosis among the patients coming under our observation. This has only just begun but the preliminary observations tend to confirm impressions that up to the present time, at least, food conditions have played practically no part in the war tuberculosis problem in France.

Civilian Tuberculosis in England

The anti-tuberculosis campaign is well organized in England along lines similar to those in America. It has of course been much disturbed

TABLE IV

England and Wales

Year	Deaths from Pulmonary Tuberculosis		Total
	Males	Females	
1911	21,985	17,247	39,232
1912	21,568	16,515	38,083
1913	21,034	16,021	37,055
1914	21,812	16,825	38,637
1915	23,630	18,046	41,676
1916	23,238	18,307	41,545
1917	23,670	19,443	43,113

by the war but the system of state organization with special tuberculosis health officers for each county has in general held it well in line, so much so, as to challenge our admiration. With the staff of physicians and nurses markedly depleted, with the tremendous urgent demands of war needs, the tuberculosis work still goes on, handicapped but not interrupted. The public health records are also kept up in excellent form, although of course war conditions and the disturbed distribution of population here as in France, render it difficult to draw accurate conclusions from statistical returns.

The report of the medical officer of the Local Government Board for the year 1917–18 shows a distinct increase in pulmonary tuberculosis in 1915, 1916 and 1917. Other forms of tuberculosis have not increased.

Table IV shows the exact figures in deaths from pulmonary tuberculosis in England and Wales for the years 1911–1917 inclusive, and Table V shows the effect of the war more strikingly by indicating the increase of such deaths for each year of the war over those of the year 1913.

The progressive increase is very evident and is distinctly more marked among women. The comparative number of deaths is probably a more reliable index than percentages on account of the unreliable data on actual population; also, the deaths among women may be assumed to afford a better criterion of the effect of social conditions, both because of the removal of the large proportion of the male population with the army and also because the men left at home would naturally include all of the physically unfit among whom the rate of tuberculosis might be expected to be abnormally high.

The medical officer in his report does not hesitate to attribute this excessive mortality among women "to their extensive employment in munition and other industrial occupations under conditions of exceptional stress and strain, often associated with crowded lodging accommodation."

TABLE V

England and Wales

Year	Increase in Deaths from Pulmonary Tuberculosis over the Number Occurring in 1913 among		
	Males	Females	Total
1914	778	804	1582
1915	2596	2025	4621
1916	2204	2286	4490
1917	2636	3422	6058

Further analysis of the returns shows that the striking increase is among women of the age group 15–25 and that it is most evident in the industrial centers. Interesting confirmation of the effect of war industry upon tuberculosis is afforded by a special report to the Ministry of Munitions by Captain Greenwood and Dr. Tebb. After a very exhaustive statis-

tical study amplified by certain field investigations they conclude that in 1916 and 1917 there was a distinct increase in tuberculosis in industrial centers, especially among females between the ages of 15 and 25, while in rural districts this increase among women of this age is not shown, but the curve of mortality is similar although somewhat higher than the preceding years. They conclude that certain occupations among city dwellers show results only explicable by the assumption that such employment introduces a special factor which favors the development of tuberculosis. They also conclude from their investigation that domestic overcrowding is not a sufficient explanation of the increase of tuberculosis, because such overcrowding is very common in many rural districts and because their special field investigation did not show (statistically at least) that this overcrowding is the prime factor. This is particularly interesting, not so much as disproving the influence of overcrowding but rather as placing the greater emphasis upon the rôle of unfavorable industrial conditions.

In general it may be said that poverty among the working classes of England does not appear a striking war condition on account of high wages and plenty of work and also that here as in France the food factor is not important. Food in England is most carefully distributed by an efficient rationing system, but the supply is sufficient so that malnutrition is not increased even among the poorer classes.

We therefore see that our experience in France is strikingly corroborated by that of England so that the effect of the war among civilians appears to be a problem of industry in the larger cities, especially among young women, with overcrowding an important although possibly a secondary factor and with no influence attributable to insufficient food.

In Occupied Belgium. I had the unexpected good fortune to visit the authorities of the Belgian Government at Havre just as Mr. Hulot, the Inspector de Service de Santé, had completed a very full and remarkable report to the Minister of the Interior upon the health conditions in occupied Belgium. This report is based upon detailed personal descriptions of actual conditions in various parts of Belgium under German domination collected through the Ligue Nationale with headquarters in Brussels. The writers are for the most part physicians who support their vivid reports of the heartbreaking conditions with technical details which command acceptance. I wish that it were possible to reproduce the agonizing cry of distress as well as the testimony of heroic struggle against overwhelming odds which rings throughout the pages of this intensely human document. But we must limit ourselves to those portions which deal with the tuberculosis problem and its corollary, the problem of food.

From all the numerous sources the testimony is unanimous in stressing infant mortality and tuberculosis as the urgent problems.

These conditions are well demonstrated in Chart I reproduced from Dr. Hulot's report, which shows the comparative mortality for the years 1913–1917 for the cities of Antwerp and Liege. The same startling increase, especially for 1917, is evident in both, the increase of 1917 over 1913, 94 per cent. in Antwerp and 102 per cent. in Liege.

The story of food conditions is the same from all parts of Belgium. As an example I will quote from the report of M. le Dr. Van Cauegham of Bruges which may be taken as indicative of the situation in general.

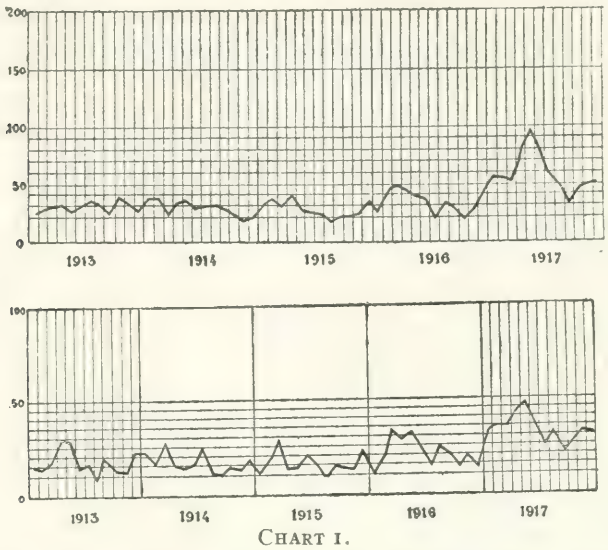

CHART I.

He addressed to the Spanish Minister the following report in May, 1918:

At the present time, the individual per diem ration of our population is composed of 300 grams of bread, 11 grams of meat, 15 grams of lard, 30 grams of rice, 18 grams of corn flour, 18 grams of beans and 8 grams of sugar.

The other articles of food that formerly gave our population the energy necessary to meet its physiological needs are no longer accessible—as concerns meat, it can claim it has the right to 75 grams per week and per person, 75 grams which it is not yet given regularly; sausages and preserves practically do not count, fish arrives in very little quantities and at prices altogether beyond the reach of the working classes (O Fr. 75 to 1 Fr. 25 a piece for herring); mussels arrive but once in a while and crawfish practically never. As for articles of food rich in fats, milk can no longer be obtained, and only in trifling quantities for the sick; the quantity of butter left to the population is so reduced that it no longer counts as a food. It is the same with the home-made lard; cheese has practically disappeared.

Since the 15th of April, 1917, there has been no distribution of potatoes. Beer, very scarce, is not capable of increasing perceptibly the nutritious value of our food ration. There remains therefore practically as regards the regular feeding of the large part of the population only the ration indicated above.

According to all evidence that science places at our disposal the food ration that is accorded to us, for the households counting only adults and young people, is altogether insufficient both from the point of view of quantity and of quality.

Mr. Hulot informs me that the average adult daily ration for all of occupied Belgium has averaged between 1800 and 2000 calories for the entire year 1918. It requires no imagination or scientific knowledge to correlate the increase of tuberculosis with the insufficiency of food,

affording a striking contrast with the conditions noted in France and England.

Belgium has already organized a splendid program for meeting its after-war tuberculosis problem and I am informed that the Ligue Nationale, struggling under the intolerable burden of supplying relief of all sorts during the German occupation, has in addition raised a fund of 6,000,000 francs for tuberculosis with which this program is to be launched.

Truly the little that our country has done or can do to help this heroic people fades into insignificance when we realize what they are doing to help themselves.

In Germany. Accurate information from Germany is of course scanty but the official publications of the German Imperial Health Office have been issued weekly and show the population, births and mortality from various groups of diseases in cities of 15,000 or more inhabitants. This constitutes a total population of about 27 million or a little less than one-third of the total population of Germany.

The total deaths from tuberculosis in 1913 was 40,625, in 1916, 48,446, in 1917, 67,208. The percentage of tuberculosis deaths and total deaths were 11.2, 10.4 and 12.7 respectively for these three years, but excluding deaths from wounds which are included in the German figures and not in those of the other countries cited we find that this ratio for 1916 would be 13.3. Similar data for 1917 are not available.

If we take only cities of population of 200,000 or over, comprising 11 million in all, we have the general situation shown in Table VI. This is only for the 11 months available for 1917 and consequently the corresponding months of 1913 and 1916 are used for comparison. This table shows a rise in tuberculosis death rate from 1.51 per 1000 in 1913 to 2.31 in 1917, the general death rate having risen from 12.2 to 17.9, It is a striking fact that the big increase in both did not occur until 1917.

TABLE VI

Germany—In all Cities over 200,000 Population

Year	Population	Total Births	B. R.	Total Deaths	D. R.	Deaths under 1 year	I. M.	Tuberculosis Deaths	Tub. D. R.	Resp. D.
1917 (11 mo.)	11,344,917	123,489	10.9	202,694	17.9	18,887	146	26,305	2.3	23,533
1916 (11 mo.)	11,621,462	142,853	12.3	173,539	14.9	18,462	129	18,969	1.6	18,803
1913 (11 mo.)	11,014,857	229,938	20.9	134,515	12.2	31,991	139	16,520	1.5	16,603

the year 1916 showing only a moderate increase in both general and tuberculosis death rates. Other points of interest in this table are the tremendous fall in birth rate, 1917 being about half of that of 1913 or 10.9 against 20.9, and also that the increase in infant mortality rate is not very marked in 1917 and in 1916 is below 1913. This is a circumstance difficult to understand.

Conditions in the City of Berlin are distinctly worse as shown in Table

VII. The statistics show a tuberculosis death rate of 3.1 in 1917 as compared with 1.7 in 1913; a general mortality rate of 23 against 12.3; a birth rate of only 9.9 against 17.9 and a marked increase in infant mortality from 138 to 160.

It must be remembered that all of these figures must be accepted with reserve, as even though they are official we know nothing of the actual conditions under which they were compiled.

TABLE VII

Berlin

Year	Population	Total Births	B. R.	Total Deaths	D. R.	Deaths under 1 year	I. M.	Tuber-culosis Deaths	Tub. D. R.	Resp. D.
1917 (11 mo.)	1,728,198	17,153	9.9	39,823	23.0		160	5329	3.1	
1916 (11 mo.)	1,800,742	20,802	11.6	32,845	18.2		127	3658	2.0	
1913 (11 mo.)	2,079,789	37,190	17.9	25,579	12.3		138	3518	1.7	

In Austria-Hungary. The only available data upon the conditions in Austria-Hungary that I have been able to find are given by Sir Bernard Mallet,[2] the Registrar General of England who furnished the information shown in Table VIII for the cities of Vienna, Prague, Triest and Budapest. In the period shown which is only from 30 to 35 weeks the deaths

TABLE VIII

Deaths from Tuberculosis

City	September Quarter		December Quarter	
	1913	1917	1913	1917
Vienna	1395	2484	1407	2029
Prague	464	681	421	561
Trieste	213	267	198	238
Budapest	722	1389	687	1138

Percentage of All Deaths

	September Quarter		December Quarter	
	1913	1917	1913	1917
Vienna	20.8	23.7	17.7	21.2
Prague	24.4	22.2	22.4	20.0
Trieste	17.2	22.8	15.0	20.1
Budapest	18.0	24.1	15.1	21.2

[2] "The Effects of the War as Shown by Vital Statistics," Journal of State Medicine August, 1918.

for tuberculosis increased from 7311 in 1913 to 11,755 and in 1917 or over 60 per cent., while the increases in the percentage of tuberculosis to all deaths varied from 25 to 45 per cent. These figures indicate conditions far worse in Austria-Hungary than in Germany. Sir Bernard Mallet assumes the probability that bad food conditions are primarily responsible for this situation.

In Servia. We know quite as little of conditions in Servia as we do of those in the Central Empires. Some indications, however, are available, mainly attained through the Servian Health Commission in France. Dr. Petrowich of this commission in an article upon "Pulmonary Tuberculosis among the Servian Refugees in France" estimates upon the basis of 15,000 persons examined that at the present time 15 per cent. of his countrymen suffer from the disease. The American Red Cross has established a special Servian Bureau in Paris under the direction of Dr. Howard Woolston, and the investigations of this bureau show that there are 15,000 refugees in France and among them are 2000 tuberculous or about 13 per cent. Certainly every indication points to an enormous incidence of tuberculosis in Servia as the result of privation and insufficient food.

When we attempt to visualize the situation which must exist among many other nations whose tragedies are as yet inarticulate, when we try to think of Russia, of Poland, of Armenia, of Roumania, to say nothing of the enemy nations themselves, we get some dim perception of the unheard-of burdens of suffering and disease which the war has brought to hundreds of thousands of the civilian population. Tuberculosis will surely be one of the most frequent consequences of such experiences and all of the available resources of the rest of the world will hardly be adequate to mitigate its ravages in these stricken countries.

SOME LESSONS LEARNED FROM WAR EXPERIENCES

Turning from this necessarily cursory review of the tuberculosis situation in Europe occasioned by the war, let us consider some of the lessons which may be learned from it in the problems which now confront us not only in Europe but here at home.

1. The experience of the armies indicates that we may need to readjust our ideas of the hazards of hard physical exertion and exposure as regards the breakdown of resistance to tuberculosis provided these conditions are combined with open air life. In the latent or arrested cases the contrast between the effects of army life and that of city industrial life seems to be too well substantiated to be gainsaid. It speaks in favor of the advocates of physical work in the open air for cases of inactive tuberculosis and indicates that the risk of overwork in such cases may be less than we have become accustomed to believe.

2. The infrequent development of pulmonary tuberculosis as the result of exposure to poisonous and irritating gases and of chest wounds raises the question as to whether we have not in the past over-emphasized the dangers of mechanical irritation and trauma as exciting causes of active tuberculosis.

3. The very remarkable success in the American army of the system of rapid but systematic chest examinations in eliminating to such a large extent those individuals liable to develop active tuberculosis leads the way to the adoption of similar methods to large groups in the community, especially important perhaps, among industrial workers.

The standards adopted by our army have eliminated many of the ultra refinements in physical diagnosis and yet have been most satisfactory. This raises the question of the practical value of such intensive methods and whether their application has not worked considerable injustice in the past by attaching too great importance to slight variations from the normal. My own conviction is that we should never, where practicable, neglect any known method, but that in making a diagnosis of tuberculosis we should keep more clearly in mind that many such cases have not active disease and do not require the strict sanatorium regime, but rather a modification of their modes of living which we might designate as precautionary and preventive and which does not involve the disruption of ordinary life necessary for active cases. Such a plan involves much individual thought, supervision and attention and considerable skill, and perhaps we have been too prone to place all cases into one category, thus working injustice not only to the individual but to the community.

4. The experience among the civilian population of Europe which we have studied throws them into two main groups. France and England on the one hand and Belgium, Germany and Austria-Hungary on the other. In the former tuberculosis has only slightly increased since the war and this mainly among young women in industry. In the latter all classes of the community have suffered and to a rapidly increasing extent as the war went on.

The principal difference appears to be that of food.

Speaking generally, there has been no food problem in either France or England to the point of insufficient nourishment. That such has been the case is one of the wonderful achievements of the war to which the people of our own country have contributed in no small measure.

In the other groups of countries we have every reason to believe that the conditions described in Belgium are representative and that there has existed long continued undernourishment among the masses of the people and, that the increasing mortality from tuberculosis is largely dependent upon this factor, there can be little or no doubt. The mortality curves in Belgium indicate that such conditions can be withstood for some time, even a year or two without marked effect, but that after that time the effect is cumulative and the results become rapidly disastrous as the resistance of large numbers is broken down. The net results of such long continued inanition is not death from starvation but rather the widespread development of terminal infections of which tuberculosis is perhaps the most prevalent. If this is true for the countries mentioned, the incomplete information available would indicate that it is even far more so for Russia, for Poland, for Turkey, and the Balkan States. It is not improbable that the world faces to-day the tragedy of widespread famine in these countries with a toll of human life which may dwarf even the

terrible losses of the war itself. In this toll, tuberculosis will surely play a leading part.

But apart from this evident and urgent problem may we not learn a lesson too in this connection for our own country only lightly touched by the war. Is it not probable that much of our tuberculosis develops because of long continued insufficient or improper nourishment among many of our people, and is not this perhaps the most potent factor in rendering the disease one particularly of the poorer classes? We have long known that this is true, but have we in our programs of prevention stressed this as we should, and have we taken any adequate constructive measures to meet this phase of the problem? Is it too much to hope that a nation capable of the wonderful exhibition of voluntary food conservation and restriction with which we have thrilled the world in the past two years, may be able to work out some plan of more equal distribution of food, so that the pre-war waste of our well-to-do classes may in the future be eliminated to help conserve the health of those less favored, as it has that of England and France during the war?

5. But then there are other lessons in economics to be considered. We have seen the interesting similarity of experience in France and England and we have analyzed this to mean largely industrial conditions especially among young women. I would not minimize the housing problem, but to this we are already alive and much has been done to remedy conditions. This will and should be continued and extended. But we have only barely begun any systematic attempt to attain better industrial hygiene. The experiences we have recounted would indicate that this phase of preventive medicine must loom very large in our future program and that systematic supervision of working conditions must become, far more than in the past, a part of our community responsibility. The leaders of the working classes, especially the trades unions, appreciate this more keenly than do the rest of us, who have thought more in terms of home supervision and sanitation. These must go hand in hand and side by side as they have not as yet. The future is big with possibilities in this direction.

6. The last suggestion which I would like to present from our war experience is that of reëducation and vocational training for the tuberculous.

The war has wrought an extensive development of systems of reëducation for maimed and wounded soldiers which have aroused widespread interest in all countries and have already obtained striking results. The same plan is being applied to the tuberculous soldier.

In England especially, the idea of industrial colonies has developed very rapidly and in France also, two or three such colonies are in operation.

I have had the opportunity to study some of these colonies in both countries and am much impressed with the possibilities which they offer not only for the soldier but for the tuberculous civilian as well.

It is common knowledge that the after care of the discharged sanatorium case is as yet the big unsolved problem in the management of tuberculosis. Our follow-up systems are inadequate; our experiments with farm col-

onies have failed. Our arrested cases of tuberculosis continue to return to unfavorable environment and relapse in depressing numbers.

The chief factor in this situation is economic, the necessity of earning a living, which presses so heavily upon these cases in the majority of instances, and the easiest way for them is to return to their old jobs and take a chance on the relapse which all too frequently follows.

The tuberculous soldier is in a different position, which both England and France have been quick to realize. He may, if the government desires, be retained in the army under orders to continue treatment as long as may be necessary, or he may by a wise use of pension benefits be relieved of the urgent necessity of quickly returning to civilian work in order to support himself and his dependents.

The great development of reëducation for the mutilated soldiers has paved the way for similar schemes for the tuberculous. They appeal to the imagination and to the sense of justice of private individuals and governmental authorities alike. They are and will be amply supported with necessary funds, fully justified by the success they have already attained.

It remains only for well directed initiative to direct this same interest and support to the tuberculous soldier.

Already in this country a beginning has been made through the Surgeon General's office and the Federal Board of Vocational Education, coöperating with the National Tuberculosis Association. Such a movement should enlist the support of all interested in anti-tuberculosis work for, if the experiments with the soldiers succeed, the adaptation of the same methods to civilians will be an easy step and the record of success will be the solution of one of our most vexatious problems.

Enthusiasm in this direction should, however, be tempered with cautious judgment, for the English experience has already shown that the task is not simple and that adequate methods as yet have not been evolved. The tuberculosis industrial colony is still in the experimental stage but gives evidence of most promising possibilities. It is hoped that the idea may be worked out slowly and carefully in this country in order that full use may be made of the extraordinarily favorable combination of circumstances afforded by the experiences of the war. The responsibilities of the situation are great, for failure now might deal a death blow to all future reëducational schemes to restore the tuberculosis patient to economic independence.

CONCLUSION

Our consideration of tuberculosis and the war has led us far and consumed much time but even so has only touched some of the salient features of the situation. This discussion aims only to be suggestive and not exhaustive. It could not be otherwise from the very nature and vastness of the problem. We shall continue to learn important lessons of public health from the war long after the final treaties of peace are signed. We face to-day, however, in all fields of human thought and endeavor a period of reconstruction solemn in its responsibilities as it is pregnant with possibilities.

Among other vital interests the health, the very existence even, of millions of people all over the world is at stake. It devolves upon all those who have had previous experience or interest in health problems to assume their full share of the responsibility and of the burden. Probably never before in the history of the world has the need of wise leadership and sane judgment been more urgent.

The best that we can hope for America as its share in this crisis is that the same energy, the same perseverance, the same courage, and the same spirit of self-sacrificing idealism that has inspired our country at war and our wonderful soldiers in France, may continue to dominate us in these less stirring tasks of the rehabilitation of the world. Of these, none are more important, more vital, than the preservation of the health and the lives of the people. Ever mindful of the fearful price which has been paid to gain the peace in which we all rejoice, may we bend all our energies with renewed consecration to meet the solemn responsibilities which it imposes upon us.

CLINICAL FOLLOW-UP OF INFLUENZA CASES

By P. CHALLIS BARTLETT, M.D.

Framingham, Mass.

In the work of the Framingham Community Health and Tuberculosis Demonstration it seemed necessary to find out as much as possible about the after-effects of the influenza epidemic.

The epidemic started in Framingham early in September, 1918. About 1500 cases were reported, and it was estimated that the total number of cases was approximately 3000. During 1918 the death rate was 5.9 per 1000 of population from influenza. In this clinical examination work we have been able to examine 700 cases to date, following influenza. A few of these cases were examined six weeks after they were up and about following the attack. The great majority were examined from two to four months after the attack. This we believe gives a better clinical picture of the after-effects resulting from influenza.

In making this survey the following program was laid out:

Framingham Influenza Follow-up

A. Groups to be Reached

1. Tuberculosis cases having had influenza, including active, arrested, and suspicious.
2. Special influenza victims under observation for possible pulmonary sequellae.
3. All individuals reported as having had influenza.

B. General Method

1. General educational propaganda on the necessity for medical observation after influenza—special bulletins, newspaper articles, etc.
2. Notices and letters to private physicians urging reëxamination of patients and offering specialist consultation service in "after flu" cases.
3. An intensive nursing and medical review of known tuberculosis cases, with special reference to those having had influenza.
4. The promotion of general medical examinations throughout the population generally, at the dispensaries, by private physicians, in schools, factories, etc.
5. Special follow-up on influenza group (see "C").

C. Special Influenza Group Follow-up

1. Secure reports from health authorities and classify according to most convenient arrangement for follow-up.
2. Mail special literature with cut-out slips for examination requests to all influenza cases.

3. Publicity through the newspapers, with advertisements carrying cut-out slips for examination.

4. Literature on general medical examinations mailed to influenza patients.

5. Special notices to physicians.

6. Arrangements to make examinations in homes, dispensary, or in physician's office, in consultation.

7. Preparation of special medical examination record forms.

8. Canvass of influenza patients by nurses, to secure permission for examinations and to arrange appointments. A nurse at this time also distributes urine specimen bottles.

9. Visit of homes or meeting of patients in Health Station by physicians. The best time for home examinations is in the late afternoon and early evening. Urine specimens are collected by examining physician who visits the homes accompanied by the nurse. The latter assists in taking histories, etc.

10. An analysis of records, comparison of medical findings with past records of individuals previously examined, etc.

11. Examinations are for the most part being made three or four months following the influenza attack.

12. For subsequent follow-up, it is planned to have a nurse make a rapid survey of all influenza cases that can be reached at three months' intervals following this post-influenza examination.

One of the leaflets sent to each person having had influenza was as follows:

AFTER THE "FLU"—WHAT?

The Epidemic Is Burning Itself Out—What Will It Leave Behind?

If you have had influenza, or influenza and pneumonia, you have suffered from a bad combination of diseases. Past experience shows that influenza is likely to leave behind even more serious conditions, such as heart trouble, kidney disease, and lung weakness.

Tuberculosis May Frequently Follow the "Flu"

The years following the influenza epidemic of 1889–1890 showed for practically all cities an increase in death rates from such diseases as pneumonia and the more prominent causes of death.

How can we in Framingham avoid these serious consequences? Most of these conditions, *if detected early*, can be cured, especially tuberculosis.

If you have had the "flu," you should have *a thorough medical examination*, particularly if you feel "run down" and do not "come back" with your usual "pep."

See your own physician, or arrange for an examination with the Community Health Station. The Health Station physician will examine you at your home, at the Health Station, or in consultation with your physician at his office.

In this way you can detect the early signs of any serious after effects. Don't let the "flu" get the best of you through its after effects. *Be examined early.*

Think this over and make an arrangement with the nurse for an examination when she calls in making her "flu follow-up" visits.

Remember that it is not necessary to have influenza before you can be examined. The Health Station examinations are going on constantly and are available to all without charge. At this time, however, first attention will be given to influenza work.

If you desire to be given *first* consideration in the expert "follow-up" examination work, fill out this section below, tear off, and mail to

COMMUNITY HEALTH STATION,
Union Avenue, Framingham, Mass.

Date.....

I would like to have the nurse call to arrange for a medical examination.

Name.....

Street.....No.....

There was also a card sent in all of our local mail to stimulate examinations, as follows:

HEALTH EXAMINATIONS

Over 10,000 Framingham people have had medical examinations in the last two years at the Health Station, or in schools, factories, etc.

Are you one of these?

If not, why not help to bring up the total? An examination *now* may add years to your life and comfort to your living.

The Health Station expert examination facilities are always at the disposal of Framingham citizens. Numerous examinations are made daily.

If you wish the nurse to call to arrange for an examination for yourself or your family, at the Health Station, your home, or in consultation with your physician, fill out below and mail this card to the *Community Health Station, Union Avenue.*

Name.....

Street.....No.....

The examination form used in this drive was simple and called for very little previous history:

EXAMINATION RECORD

COMMUNITY HEALTH DEMONSTRATION

No.....
Date.....

(Influenza Follow-up)

Name.....Age.....Sex.....
Street.....Number.....
Influenza Attack:
Date taken.....Duration.....Mild.....
Moderate.....Severe.....Home.....
Hospital.....M.D.....
Convalescence.....
Complications: Pneumonia.....Other.....
Other cases in family.....

Previous History:
Other illnesses: Tuberculosis.....Pneumonia.....
Heart Trouble.....Etc.....

Present Condition:

General Nutrition.....Strength.....
Tonsils.....Glands.....
Heart.....
Pulse.....Blood Pressure.....
Lungs.....
.....
.....
Urine.....
Remarks: .....
.....
Examiner.....

The most of the examinations were made in the homes, and two per cent. of the cases were examined in consultation with the local physicians. In this clinical follow-up of influenza cases, there were 295 males and 405 females examined, divided into the following age groups:

Under 5	105
5 to 9	155
10 to 14	88
15 to 19	41
20 to 24	50
25 to 44	198
45 to 64	47
65 and over	7
Unknown	9
	700

Youngest 10 months, oldest 72 years.

This gives 41 per cent. in the industrial age group (15 to 44). Each person examined was asked regarding the severity of the disease. Their own estimate, with what the physician had told them, was recorded. They were divided as follows:

Mild	418
Moderate	217
Severe	65
	700

There were unquestionably cases reported as influenza that were ordinary colds, coryzas or bronchitis, but, with the epidemic of influenza prevalent, the diagnosis of influenza was made. In this examination work only the cases that had been confined to the bed were considered and examined. This in part accounts for the small total as compared with the gross number of cases.

The length of time in bed was considered to be a fair estimate of the severity of the disease in the cases studied.

Patients in bed less than 1 week	210
1 to 2 weeks	282
2 to 3 weeks	123
3 to 4 weeks	48
4 to 5 weeks	19
5 to 6 weeks	8
6 to 7 weeks	3
7 to 8 weeks	3
10 to 11 weeks	3
4 months	1
Total	700

Of the 700 persons examined, there was about ten per cent. in which there were no other cases in the family or in the home where they lived. In 21 of the persons examined we were unable to find out about the number of other cases in the family. The remaining 87 per cent. examined were in families where there were one or more cases ill with the disease. About five per cent. of the persons examined were treated in a hospital. The rest were cared for in their homes or boarding-houses. Sixty-three of the people examined gave history of having had pneumonia during the attack.

It is interesting to note, whereas about 16 per cent. of the entire population of Framingham was infected with influenza, only four per cent. of the tuberculous group in the community was infected.

In the physical examination of these post-influenza cases, nearly eleven per cent. were found with broncho-pulmonary signs. Out of this number eight people have been placed in our suspicious tuberculous group and will be intensively studied. The remaining cases will be examined again if possible in a few months to see if anything further has developed to place them in the tuberculous class.

In the examination drives before the influenza period we had examined 4473 persons. The age and sex distribution of this group is quite similar to the influenza group. In these examinations there were approximately six per cent. found with broncho-pulmonary signs at the time of the examination, so that in the post-influenza examinations there were nearly twice as many people found with broncho-pulmonary signs. The average time after the influenza that these people were examined was three months, and that so large a percentage showed signs in the chest would indicate that in many instances there will be a more or less chronic condition. A few of these cases showed a localized area of fine to medium moist rales in one of the lower lobes, and frequently a slight area of dulness. The larger number of cases in this group showed scattered sibilant and sonorous rales without any dulness. Only one or two of these cases were having fever at the time of the examination.

One male patient examined six weeks after the onset of influenza was found with an entire lobe of the left lung posteriorly showing marked dulness to flatness, bronchial breathing over the entire lobe and with scattered areas of moisture. This patient has been examined once or twice since and the lung has partly cleared. There is, however, some dulness with scattered moisture on cough, but no fever and only slightly elevated pulse.

The heart examinations in this group showed eight per cent. as having cardiac signs. Of this number one-half could reasonably be placed in the class of chronic valvular lesions. Seven had murmurs of a functional character, and 21 had signs of enlargement or irregular action in which there were no murmurs detected. In the examination drives preceding the influenza we found five per cent. of the people examined with cardiac signs of the same types as here recorded. In this post-influenza series, it will be noted that there were about three per cent. more cases found with cardiac signs.

In these follow-up examinations, there were 212 urine examinations made. 4+ per cent. showed albumin—one of these showing a few casts besides; 1.4 per cent. showed slight traces of sugar.

Of the 700 people examined, there were ten with apparently arrested tuberculous disease at the time of the influenza. One stationary far-advanced case of tuberculosis had a mild influenza and four months after the influenza the signs and symptoms remained unchanged. Four of the ten cases of arrested disease showed slight activity in the lungs from four to six months after they had apparently recovered from the influenza, but without elevation of temperature. One had decidedly elevated pulse and all of the four did not feel as strong and able to work as before their upset.

During this drive 13 people, or about two per cent., were found in whom the diagnosis of active pulmonary tuberculosis was made. Five of these cases had had pneumonia during their influenza.

One of these cases is now classified as a far advanced case of tuberculosis with rapidly advancing disease. This patient had influenza and pneumonia in the early part of the epidemic and was very ill. The physician was discharged before the temperature had reached normal. From the history given by the patient later, the patient evidently never had an entirely normal temperature, but gained strength and finally sat up and was out of doors four months after the influenza onset. She then had a sudden hemoptysis, was sent to the local hospital, tubercle bacilli were found in her sputum, and physical examination showed the entire upper lobe of the left lung involved. The x-ray also showed a well marked consolidation of the lower lobe of the same lung. This patient was soon after sent to one of our tuberculosis hospitals by the Board of Health. From the previous history in this case there was nothing to indicate any pulmonary disease. The patient was a member of a family that had been seen many times by our nurses and examiners. She was a strong, well nourished girl of 15 years and had been at work for a year or two. One of the children in this family had the von Pirquet test in our von Pirquet survey and had one of the most marked reactions of any of the cases, but has always been strong and well and the physical examinations have been negative.

Another of the tuberculous cases discovered after influenza developed an acute pleurisy with effusion four months after a mild attack. The patient was a nurse 22 years of age. She was never robust but was able to do her work and for the past year had gained in general strength. A few days after the development of the pleurisy she began to have an elevated and irregular temperature. Three tappings were necessary to remove the fluid because of the pressure symptoms. The x-ray showed characteristic thickening of the lung markings with beadings running to the apex.

Another case in this group was examined four months after a mild influenza and on physical examination the chest was found to be clear, but as the patient had not regained her strength and was losing weight, it seemed advisable to have a further physical examination. The case left Framingham for a time and was lost sight of, but on her return two

months later it was found that she had developed a cough, and just before her return was examined by a physician and pronounced tuberculous. Our examination just after her return confirmed this diagnosis.

Four of these cases were non-residents of Framingham—two sent in from near-by towns for consultation and two were here as visitors for a day or so. Three of the patients in this group have had hemoptysis. Eight of the patients in this group of 13 were diagnosed as new cases of active tuberculosis. In five cases the chest signs were of an apparently arrested lesion, but there were constitutional symptoms which might be considered the result of slight activity of the tuberculous process.

In the previous examination drives, out of over 4000 people examined, about one per cent. were found with active tuberculosis. While the post-influenza group may be small to serve as a basis for definite comparison, yet it is interesting to note that about twice as much active tuberculosis was found in the group as was discovered in the examination of supposedly normal people before the epidemic. It must be remembered that in this post-influenzal examination several of the tuberculosis cases were acutely ill at the time the examination was made at the request of their own physician, and two or three others who had not called a physician realized that they were ill and wished an examination. In the previous examination work there were only a few cases in which tuberculosis was suspected and in which the physician had requested a consultation to clear up this point.

There were only two cases of empyema in the whole group examined and two cases of pleurisy with effusion. One patient examined had exophthalmic goitre preceding the influenza. She was having very little discomfort and was able to do her housework. Four months after the influenza there were marked increased signs of hyperthyroidism. One case in the group examined showed mental symptoms and on study seemed to be an early case of primary dementia. One child of nine years had enlargement of one knee joint that had persisted for two months. The x-ray did not show any evidence of tuberculosis.

Many of the people examined complained of general physical weakness several months after the influenza. In most of these cases there was a negative physical examination.

SUMMARY

1. There were approximately 1500 cases of influenza reported; 700 of these were examined from two to six months after their influenza.
2. Most of the examinations were made in the homes.
3. Forty-one per cent. were in the industrial age group.
4. Broncho-pulmonary signs found in 11 per cent.; in examinations on other groups previous to epidemic, six per cent.
5. Cardiac signs found in eight per cent.; in previous examinations five per cent.
6. Active tuberculous cases found in two per cent.; in previous examinations one per cent.

This is somewhat modified by the fact that there were more people with pulmonary symptoms who requested examinations than in previous drives.

DISCUSSION ON PAPER BY DR. BARTLETT

Dr. Hugh M. Kinghorn, Saranac Lake: The question of the future effects of influenza is a very important one. I would like to speak on just one effect of influenza which the lung specialist is particularly interested in. Of course, we are all interested in whether tuberculosis will develop as a result of influenza, but there is another disease which we must consider, and that is bronchiectasis. I should like to make a special plea for the very careful care of children who have had influenza.

The disease bronchiectasis starts very often in childhood, and we find that in the bacteriological examinations there are two organisms that are usually the cause,—the influenza bacillus and the pneumococcus. That being the case I believe that with children who have chronic cough the physician should be on the lookout for a chronic infecting agent and for a possible bronchiectasis.

Just a practical point in treating these children. I believe that where possible they should be sent in the cold months to the South. We find that in handling these cases of bronchiectasis a mild climate certainly has a more beneficial effect than a cold climate.

Dr. Charles L. Minor, Asheville: I would like to stress the importance of great care in interpreting our x-ray plates for at least six months after an attack of influenza, as this disease can cause shadows almost indistinguishable from those of tuberculosis, just as it can cause physical signs which are very apt to fool us.

A few years ago, Dr. Lord of Boston went very carefully into the matter of the imitation of the signs and symptoms of tuberculosis by post-influenzal congestion, and now since the experience in our Army in the recent war, we recognize that we must be just as careful with the x-ray plates. Apparently incipient cases of tuberculosis without bacilli, which follow on influenza, are to be considered as doubtful until very thorough study has verified the diagnosis.

Col. Gerald B. Webb, Colorado Springs: I am especially interested in Dr. Bartlett's point in regard to the possible increases of tuberculosis following influenza. I have some evidence that possibly may interest you which suggests a confirmation of his results. We had in the American Expeditionary Forces two waves of influenza: one a mild wave in France last April and May. Careful records were kept of all tuberculous cases found in the month following and almost double the number of cases were positive sputum. The second wave came in September and October. After allowance for the increase due to the troops arriving in France, we again had quite an increase in the number of positive cases with positive sputum. The increased number of cases of tuberculosis, following the two waves, aroused the suspicion that the influenza was a causative factor in that increase.

Dr. Kinghorn's point in regard to bronchiectasis was well taken. They are not the bronchiectasis of the ordinary form that we are so familiar with; they are rare conditions of what we might call the residual effusions in these cases where they have fever from time to time and chronic coughs.

Of course, the sputum is always negative in these cases. One point that I think Dr. Kinghorn might have emphasized even more than the warm climate was that a thorough investigation should be made of the accessory sinuses. In most of these cases you are going to find by the plate some trouble in the accessory sinus.

Dr. Ernest Zueblin, Cincinnati: The follow-up campaign of influenza cases as carried out at Framingham, represents an excellent piece of work which from the social and clinical standpoint is of great interest. Dr. Bartlett mentioned the pulmonary findings of one tuberculous patient particularly, and I would like to ask him over which area activity was found. In the recollection of our experiences in Cincinnati, I would like to call attention to a few predilected sites, where physical signs are frequently encountered and this for a long period past the influenza attack, even several months later. I mean the interscapular region close to the sixth and seventh interspaces on either side, more frequently on the right side. Over this area not only muscular contraction, followed later by muscular atrophy, is found on palpation, but also impaired percussion sounds, harsh breathing, prolonged expiration with moist crepitant rales and increased whispered voice are present. On the x-ray plate a dense and far-reaching hilus-shadow or even densities corresponding to the right middle lobe trunks can be made out, and on post-mortem specimens areas of bronchopneumonia can be located over the same area. In our daily practice it frequently happens that such findings are misdiagnosed as tuberculous manifestations while clinically they have no relation to tuberculous activity.

Furthermore, I think Dr. Kinghorn's remarks about bronchiectasis very fortunate. Especially in children we may encounter such conditions. I may allude to the post-mortem specimen of a child who died from influenza in which instance bronchiectasis existed chiefly in the lingual trunk, of the left lung and in the basal trunks of the left lower lobe. I was very much interested in the recent symposium on influenza in which Dr. McCallum demonstrated a series of lantern slides in which the diplococcus infection and pneumonic infiltration was especially localized along the course of the bronchi supplying the lower lobes, while streptococcic pneumonias have a greater tendency to spread towards the periphery. In the presence of such intense peribronchial infiltration in the course of a diplococcic infection the question may be asked whether such an infiltration is not a favorable factor for a more rapid peribronchial necrosis resulting in the formation of bronchiectatic enlargements. Perhaps experimental research may give us a clue to the solution of this question.

The Chairman: The paper is one of great interest. The Chair desires to state that in Camp Lewis, Washington, we had about 3000 cases of influenza. The War Department orders required that each soldier be examined at once after discharge from the base hospital, and one month later. We found that rales persisted extensively in such an enormous number that I made another examination at the end of the third month.

The results of these examinations I am not at liberty to state at the present time but I can confirm what Dr. Bartlett has already stated.

Dr. Bartlett: In regard to the cases that had broncho-pulmonary signs, I cannot state exactly what percentage had signs in the interscapular region without signs in any part of the chest. Most of the broncho pulmonary cases had simply scattered sibilant and sonorous rales. In the cases on which the diagnosis of pulmonary tuberculosis was made we tried to follow as far as possible the diagnostic standards that were written for us by a committee appointed by the president of the National Tuberculosis Association.

The diagnostic standards as outlined by this committee have a minimum requirement, and in all of the cases diagnosed as tuberculosis in this work we have followed this requirement as far as possible. In some of the cases examined tubercle bacilli were found and in others we have had x-ray, clinical examinations and history to make the picture complete as far as possible. We feel very sure that two per cent. of the cases pronounced tuberculous in this work are unquestionably actively tuberculous.

THE TEMPERATURE OF TUBERCULOSIS IN ITS DIAGNOSTIC AND PROGNOSTIC SIGNIFICANCE

By CHARLES L. MINOR, M.D.

Asheville

I do not like to go back on the Chairman of our Section, yet it is rather foolish of me to get up here and try to speak to you extemporaneously on a subject which needs careful study and preliminary preparation. I can only apologize by saying that the conditions in my practice for the last months, owing to the upset of the war, have made it impossible for me to get the time that is needed to work up a proper paper. All I can possibly do here is to indicate one or two points that have been revolving in my mind for the last few years, but I cannot give you a paper worthy of this Association's attention or discussion.

In watching cases of tuberculosis, especially the type of cases that are sent to resorts, I have been impressed with the idea that an undue weight is often given temperature in the diagnosis of this disease. We have all handled cases whose only symptom, practically, has been persistent slight temperature, and the question arises of how much weight the doctor should give to temperature in cases which are otherwise entirely negative. It is very human to allow one thing to be stressed unduly in our minds in making a diagnosis and to neglect the others, and indeed I think that nothing is more neglected in the diagnosis of tuberculosis, than a properly and carefully taken history, and nothing is so over-stressed as the temperature. The longer I practice, the more I am satisfied that there are quite a number of people, and especially children, who habitually run a temperature of 99 or even 99.2 without at that time or later developing any physical signs or symptoms of active tuberculosis, and yet who have been watched anxiously for years, in the belief that that was the cause of this slight rise.

In this connection, let me remind you that Wunderlich, supposed to be the best authority on the subject of temperature, denies that 99 or 99.2 is temperature at all. The question is what weight shall be put on a temperature of 99 or 99.2 which persists, and which is not accompanied by history or other signs or symptoms. It is well for us doctors to remember that while it is a rule, it is by no means essential that, to make a diagnosis of tuberculosis, our patient have a temperature, and on the other hand, if the patient has a temperature, that is not enough on which to base a diagnosis unless it be corroborated by many other observations.

I would draw your attention to several very well known sources for

slight temperature, which we are too apt to forget. The first is an over-activity of the thyroid gland, and I hope very much that the method of testing for hyperthyroidism, which is being studied at Saranac Lake at the present time, may help us to come to a certain determination as to whether the temperature is due to over-activity of these glands or not. Certainly I find that quite a number of persistent temperatures are of this nature, and yield to treatment directed to this gland. Then I would refer to the temperatures which unquestionably may exist in high-strung, nervous people, and especially high-strung nervous children, when they are under tension. I have satisfied myself that nervousness can keep up a persistent and exasperating small temperature when no tuberculosis exists at all, and very probably these nervous people are at the same time hyperthyroid. In this connection let me stress the importance of hidden worries, which we have all known again and again to keep us running temperatures. I once told my friend Dr. Kinghorn, and shocked him greatly by the remark, that you could not treat a case of tuberculosis without treating the person's soul, and "butting in" on his inner life; that if a girl had a love affair you had to know about it if you were going to understand her case thoroughly; that if a man was worrying over business, it was the same thing. Certainly when so slight a thing as a game of cards can send up temperature, it isn't any wonder that the rise or fall of the stock market, or the pleasant or unpleasant letters from a lover can have the same effect.

Of course, in these days, it is hardly necessary to speak of the teeth or tonsils or gall bladder infections. We are in danger at present not of neglecting them, but of over-doing them, and of bringing up a generation of people without teeth at all. At the same time we all know that the discovery of pyogenic foci around the roots of the teeth, in the tonsils, in the gall bladder and other places has produced wonderful results, even if many teeth and tonsils have been sacrificed in vain. Just as many appendices, in the past, were taken out without any results. Again a number of persistent temperatures are due to the intestinal tract, and if one can develop some method of properly sanitating this tract, it is remarkable often how these temperatures will disappear. Again, there are certain temperatures which persist in spite of absolute rest in bed, which will promptly disappear when the patient is gotten up and moderately exercised. Unfortunately I have no criterion by which I can pick out these cases, but when the case is otherwise doing perfectly well and yet persists in a slight bed temperature, I am apt to make an experiment of this sort and sometimes successfully.

Again syphilis, our old friend, of which it has been said, "when in doubt think of syphilis," is frequently a cause for temperature which has been mistaken for tuberculosis, and I can only say that it would be wise, if it were routine measure to put all tuberculous patients through a Wassermann test. Unfortunately this test no more than any other, is absolute, though we all hoped it was going to be, and that we could be absolutely sure when we found a positive Wassermann that the patient had syphilis, and that when we found a negative he had not. That, however, has

been the history of medicine throughout the ages. Every time a new test of any kind has been found, we thought we had found the absolute criterion of truth. This was the case with the original simple urinalysis, which consisted of looking at the color of the urine and tasting it, and the doctor of that day thought it was giving him absolute truth. Then when we came to the ordinary measures of urinalysis which used to be used, we thought we could diagnose Bright's disease in this way. We found that we were very far from being able to do so. Lately we have had much more elaborate tests for non-protein nitrogen, etc. etc., but although each of these, I hope, brings us a little nearer the absolute, we might just as well remember that the absolute itself we will never reach until we have reached the other world.

Every time then that we have a suspicious case of persistent temperature, let us think of all these things, and carefully estimate all these possibilities, before we are too sure that it comes from tuberculosis. Let us not suppose that tuberculosis and temperature are synonymous terms, but remember how many other things can be responsible for it. Let us also be careful that the study of the temperature is no less thorough than the study of the lungs, the study of the history, and the study of the course of the case, and we shall have fewer needless alarms about our patienst.

This is not what I expected to write in my paper. It is just what I could bring together in my mind when the Chairman would not allow me to sit down. Therefore I fear I have wasted your time, and can only end by repeating my apology.

DISCUSSION ON PAPER BY DR. MINOR

A Member: I would like to ask Dr. Minor what significance he places upon the fluctuation of temperature, running from subnormal in the morning to perhaps 99 in the afternoon.

Dr. Hugh M. Kinghorn, Saranac Lake: The question of temperature is of great importance. Dr. Minor, by the way, says he does not consider 99 a temperature. We have to distinguish whether that 99 is throughout the entire day, or is simply, say, half an hour, or shortly after a meal, or from nervousness, or from some such cause. If the patient has a temperature after a meal of 99, I do not think we should be anxious at all about it. I am, of course, talking about adults. If, however, he has a temperature of 99 throughout the day I think that there is no question that it is temperature. It is not a normal temperature and ought to be investigated. It is my experience with tuberculous patients who have had a temperature of 99, that if you give them time it will come lower. There are very few exceptions. Patients will run a little bit of a temperature, but with treatment, as their phvsical condition improves, their temperature will lower.

If the patient has a temperature of 99 throughout the day, then I believe there is no question but that we are dealing with a temperature that is abnormal. What is the cause? We should exclude nervousness. Nervous people will go to the doctor's office and will frequently have

slight temperature. Then, the intestinal canal has to be considered as a cause of temperature. There is also a group of cases that come to the health resort or to the sanatorium, that have a temperature between 99 and 100, and whose temperatures are due to infections of the teeth or tonsils. These causes should be excluded.

A very interesting cause which he mentioned is hyperthyroidism. For instance, cases will come to the health resort with great prostration, with a temperature between 99 and 100, and with doubtful physical signs at the apex. There may be a little dullness at the apex with no rales, but any one who has a knowledge of tuberculosis will arrive at the conclusion that that is not the cause of the temperature in the particular case, but that there is some further cause. If you will spend the time on these cases, usually they are women, you will find that there is a great mass of nervous symptoms. Do not just sweep these aside and think that they are of no importance. They are of great importance. You have to sit down with your patient and spend sometimes several hours to get a full history, going over every symptom, and you will quite frequently find hyperthyroidism.

That brings up the value of Goetsch's test for hyperthyroidism. I am not in a position to state whether or not it is a specific test; whether the rest will stand. But I do say that this test has drawn our attention to the hyperthyroidism. We must be aware of the fact that in this hyperthyroidism we frequently do have this temperature between 99 and 100. Hyperthyroidism is very important; it represents a very important group of cases.

Dr. F. C. Smith, United States Public Health Service: We are familiar with the patient who cannot be trusted with a thermometer and is worried when his temperature goes up a few tenths. But in the carefully recorded afternoon temperature is to be found one of the most accurate means of determining the activity of tuberculosis. Of course, that, in this Association, is a platitude. People should have thermometers and know how to use them. I have an abiding faith in the intelligence of the human race. The time will come, perhaps in a hundred years, when the layman will know practicably as much medicine as doctors do now.

The level of intelligence among men can be raised to such a degree that people will know how to interpret many of their symptoms. We should begin in the primary grades of the public schools. Every woman who knows enough to pasteurize her baby's milk, and every man who intelligently aspires to preserve his children's first teeth can be taught to interpret correctly a thermometer reading.

Dr. L. B. McBrayer, Sanatorium, N. C.: I agree most heartily with the things that Dr. Minor has said in the main. I never do agree with him fully on anything. I desire to say this, that in an assembly of this kind a discussion of this kind is entirely in order; but for the medical profession as a whole, it is not. The President of the Medical Society of the State of North Carolina on one occasion said, "There are certain clinical symptoms by which the diagnosis of tuberculosis can be made, and if the doctors of North Carolina do not do it, the people will." I

think that is a necessity. It is a necessity to find tuberculosis before they sign the death certificate, and, as we all know, the average practitioner has not time to fool with it in these days and times, but when he does take time, he will be just as good a doctor as any of us. But he has not the time to do it now, therefore he must have what we might call some "high lights," some "signal lights" in the diagnosis of tuberculosis, and there is nothing more important as one of those "high lights," than the subnormal morning temperature and the rise of temperature in the afternoon to 99.5 or above, extending over a period of a number of days, especially after the alimentary tract has been cleared and the patient been put at rest.

I will agree with Dr. Minor that the diagnosis of tuberculosis ought not to be made on those symptoms alone, or any other symptom alone, but that everything should be used that we have at our command in the diagnosis of tuberculosis. But the general practitioner cannot be a scientist. If we will keep the "high lights" before him, hemorrhage, subnormal temperature in the morning with a rise of 99.5 or above in the afternoon—if you prefer to do it that way, let him send all these men and women whom he finds in this condition to Dr. Minor to do the balance of these things—we will be going some.

Maj. Walter H. Watterson, Spartanburg, S. C.: I just want to propose a term that we have been using at General Hospital 42,—the term "toxin tolerance." I believe that every patient should be kept under observation after admission to a hospital until we can measure the "toxin tolerance" of the individual patient; that during that study we should eliminate, as Dr. Minor stated, other factors which cause temperature, etc.—teeth, ear, tonsil, intestinal tract, thyroid, and so forth. I believe that finally we may come to a point where we can state as nearly as possible the "toxin tolerance" of that individual. When we have measured that point, or as nearly so as possible, we have a basis upon which to build, and until we have that basis we have no foundation upon which to build. From that basis we may build and measure our treatment, which is different for every individual patient that comes under us for treatment.

Dr. S. W. Schaefer, Colorado Springs: This question of temperature in tuberculosis has interested me very much, and I agree absolutely with Major Smith that much more good will be accomplished by laying emphasis on slight degrees of increased temperature than by ignoring it. The subnormal temperature in tuberculosis has particularly interested me. Ten or twelve years ago a good deal was heard of the great danger of tuberculous patients running a subnormal temperature, but my experience has been that patients who are getting well improve much more rapidly when they run a subnormal temperature throughout the twenty-four hours, and my best "cures" are among those whose maximum temperature is not over 98 degrees.

As to the question of nervousness in tuberculosis, the "nervous temperature" undoubtedly exists. But one should remember that the tuberculous toxin—if you can speak of "toxin" in connection with the tubercle

bacillus—has a most marked effect on the central nervous system, and a great many symptoms are attributed to a neurotic temperament when they are really due to this action of the tuberculous toxin.

Dr. Minor: As is generally recognized, a morning subnormal temperature is a valuable aid in making a diagnosis of incipient tuberculosis, and when such a sub-normal is absent in early cases, it unquestionably increases our doubt; but incipient cases by no means always have a morning subnormal, even when they have reached the point where they have slight afternoon rise.

As regards the question of what is temperature in tuberculosis, I maintain that Wunderlich's position, backed up also by many other good men, that we do not have temperature until it reaches 99.4, has not yet been refuted, and that much harm is being done to-day by great anxiety over temperatures of 99 and 99.2. There are too many other things aside from the tubercle germ, which can produce such very slight rises, to make it safe to base a diagnosis on it. In watching the fluctuations of temperature in the study of an early case of tuberculosis, let me note here a point I have stressed elsewhere, the great importance of the doctor's keeping a two hourly graphic record of temperature during the study of a puzzling case. The effect on our minds of an ordinary written out temperature or of a graphic is very different, and the latter is very much more enlightening. On the other hand, while there are people who unquestionably will run a temperature as high as a hundred which has little clinical significance, it is not safe to take for granted that our patient is one of these, but we should lay great weight on temperatures of from 99.4 upwards. However, to do that which is now so common, to put the patient to bed rest for a temperature of 99.4 or 99.6 is distinctly unwise. When the temperature gets to 100.5 I thoroughly approve of bed rest, but underneath that point, it is distinctly better to have them absolutely recumbent out of doors, but not in bed. The extensive rest which many men are now using is but the extreme of the swing of the pendulum, though a much safer point I must admit than the other extreme of say twenty years ago, when patients were over-exercised in a terrible way. But there is no reason why the intelligent doctor cannot strike the happy medium, and not indulge in either of the extremes.

It is always a pleasure to discuss with my friend, Dr. Kinghorn, and while on non-essentials we often differ, I find that on all the deeper things, we are very much in accord.

With Dr. Smith, I must heartily disagree, and I am sorry that the English language is so poor a means of communicating ideas that he should have misconceived me so entirely. I would be very sorry to see the time come when laymen thought that they were able to make diagnoses in early tuberculosis, and it is impossible to believe that what it takes careful serious doctors many years to master, they can master without any training at all. If the thermometer were to be put generally into the hands of the public, it would be unfortunate, would alarm them unduly, and for the few cases that would be discovered, there would be many who would be entirely upset by it. After a patient is under treat-

ment, understands what he is about, I have no hesitation in putting a thermometer into his hands, though to put it into the hands of every anxious mother, brother or sister is certainly inadvisable.

As regards patients under treatment, I find that they can take their temperatures for a week or so every two hours and then every four hours, with no bad effects except in the excessively neurotic. I find also that in Jews, who are with few exceptions an extremely nervous race, it is frequently necessary to stop the taking of temperature. Ordinary people, however, can take their temperatures while on the cure safely, and I am glad to say that the bad old habit of the doctor's taking the temperature once a day during the patient's visit to the office, is being given up. That a patient often makes a suspicion diagnosis ahead of the doctor, I must most regretfully admit, but that is not a reason for entrusting him with a thermometer, but rather a reason for trying to educate the doctor better in the beginning.

I am glad to have the opportunity of paying tribute to the splendid work of tuberculosis prevention which Dr. McBrayer is doing in the North Carolina sanatorium and throughout the State, but I must differ with him in thinking that the study of all such doubtful cases should be made at first with the patient at absolute rest. If we had a positive means of determining a patient's toxin tolerance, it would be a good thing, but I do not believe we have yet reached that point. We are too prone to consider temperature as the one great thing in the study of tuberculosis, but those who have handled much of this disease recognize that there are many very bad and even desperate cases which show no temperature at all, and indeed, towards the end of many of our worst chronic cases, the patient is entirely afebrile. This is notably the case with those patients who have large amounts of caseous matter in their bodies without much active trouble going on in their lungs, and who are absorbing from this caseous matter enough toxin to produce a condition of marasmus, with a steady wasting of the body without any temperature at all. These are cases where the thermometer is worthless and the scales very much more valuable.

After all the thermometer is only one of various instruments to assist our observation, and which we would unwillingly do without, but we must not come to think it absolutely essential to our work. The doctor must know how to interpret the thermometer, just as he must his electrocardiograph and his stethoscope and his other instruments. After all it is only the old question of trying to make our diagnosis inclusive, and not to build it up on any one point or thing. Set down carefully on a chart every observation that you have made. Mark under with red pencil each positive finding, and also mark every positive finding in the history. Summate all these things carefully, and if necessary take a period of from a week to a month of careful study under varying conditions, and then out of this build a diagnosis.

But to take the temperature, as is now being done, and make it the whole and only basis of a diagnosis, is like trying to build a million dollar hotel on a small and weak foundation.

COMMUNITY MACHINERY FOR THE DISCOVERY OF TUBERCULOSIS

By D. B. ARMSTRONG, M.D.

Framingham, Mass.

From time to time discussions take place in various communities as to the most effective way in which funds may be expended in the fight on tuberculosis. Arguments are sometimes presented in favor, for instance, of the provision of hospital facilities, and in opposition to the expenditure of funds for nurses and clinics or other community activities.

The futility of arguments in favor of the adoption of a wholly one-sided anti-tuberculosis program is evident. It is like the man who had $50 to spend for a suit of clothes. In looking over the stock in his favorite store he discovered just the suit he wanted for $70. He then had to decide whether he would purchase a coat and vest now and perhaps a pair of trousers later, or modify his plans and aspirations, to the end of securing immediately a complete suit for $50. It is just as evident in the case of the man in the clothing store as it is with the community desiring to attack tuberculosis, that it is wholly essential to "cover as much of the situation as is possible."

In tuberculosis work we need the trousers as well as the coat and vest, and an inadequate hospitalization equipment, with a certain amount of community nursing and clinic service, will be more effective than a 100 per cent. hospital or sanatorium equipment standing alone in the community's defense against the disease. A chain may be only as strong as its weakest link, but a chain of one link is no chain at all.

What, then, constitutes a complete community equipment for tuberculosis detection, control and prevention? We cannot here discuss a complete program in detail, but we wish to emphasize certain neglected links in the anti-tuberculosis chain. In brief, it may be stated that recent experience seems to indicate that the chief deficiencies in tuberculosis programs are found on the side of discovery or disease detection. Numerous recent articles and discussions have dealt with the "next step in the tuberculosis program." On a basis of the Framingham experience, we would say that the "next step" is the *first step*, which has long been overlooked, namely, the discovery of tuberculosis.

Up to the present time, communities that have been provided with hospital facilities, clinics, tuberculosis nurses, and a certain amount of educational work have considered themselves admirably equipped for tuberculosis work. May it not be that too much, not reliance, but responsibility has been placed upon these community devices, particularly upon the public health nurse? The clinic and the nurse in the

community have been expected and have failed to discover tuberculosis. As follow-up and treatment instrumentalities, they are most essential. It would seem, however, that a community which attempts only a nursing and clinic program is aiming at the third step in anti-tuberculosis work and is ignoring at least two essential preliminary measures, namely, social organization and disease detection. Without these preliminaries, equipment for treatment cannot be most effectively employed.

In spite of the excellent standards established and attained in tuberculosis nursing, in spite of the unjustifiable demands for the discovery of tuberculosis which have been placed upon the nurse in the so-called tuberculosis surveys, it is evident everywhere that the nurse cannot and should not be depended upon to unearth tuberculosis. Essentially this is a medical job, and requires medical machinery; and no group of individuals is more ready to acknowledge this fact than the public health nursing leaders in this country.

By way of illustration, in Framingham, at the beginning of the Health Demonstration in the spring of 1917, a health census or sickness convass was undertaken, which was in part at least a tuberculosis survey by nurses. This survey disclosed a certain amount of hitherto unknown tuberculosis. A week or so later, in the first medical examination drive in Framingham, a large section of the sickness census group was given thorough medical examinations. The medical examinations of the very people previously covered by the nurses in their canvass or survey disclosed approximately *nine times* as much tuberculosis as was found by the nurses.

For some time preceding the Health Demonstration in Framingham, the community possessed an excellent tuberculosis clinic, presided over by one of the most public-spirited and efficient clinicians in Massachusetts. The community also employed one of the best tuberculosis nurses in the state, carried on an active anti-tuberculosis educational campaign, and had at its command reasonably adequate hospital facilities through the state sanatoria and other agencies. With this program, the ratio of known cases to deaths averaged three or four to one, and would undoubtedly have remained about the same during the last two years, if certain special measures for the *discovery* of tuberculosis had not been initiated, or, in other words, if certain very important links in the anti-tuberculosis chain had not been welded. These new links have greatly altered this ratio, as will be pointed out shortly.

The previously recognized devices for meeting the tuberculosis problem in Framingham and elsewhere, may be briefly enumerated as follows:

1. Improvement in general community sanitation.
2. Public health and anti-tuberculosis educational work, aimed primarily at the prevention of infection.
3. The tuberculosis clinic, for the treatment of home clinic cases.
4. The tuberculosis nurse, incidentally for the discovery of new cases, but primarily for home treatment supervision.
5. Bed provision for institutional cases.

In general, the chief features which have, in a partial way at least, been added to this program in Framingham, and which may prove useful elsewhere are as follows:

1. Educational work, not only against tuberculous infection, but primarily for constructive hygiene and against tuberculous disease.

2. Community organization work, of a more extensive as well as intensive character than hitherto devised, in particular the development of intimate neighborhood leadership, to serve all phases of the tuberculosis program, including disease detection, treatment, follow-up, educational work, etc.

3. The adoption of a more flexible and functional basis for the classification of tuberculosis cases, encouraging the recognition of modifications in the routine observation of special groups, such as the arrested cases, particularly as regards their social and economic adjustment, etc.

4. The use of all possible routine as well as extraordinary devices for the discovery of tuberculosis.

As it is the object of this paper to deal primarily with this last mentioned factor, no further attention will be given here to the problems of education, neighborhood or community organization, disease classification, etc.

What have been the chief methods employed in the discovery of tuberculosis in Framingham, and what have been the results of these special efforts? To answer the latter question first, a crude indication of the results attained may be given by presenting in a very brief way the outstanding facts with reference to tuberculosis incidence in Framingham during the Demonstration.

On January 1, 1917, there were 27 known cases of tuberculosis under care. During the year preceding the Demonstration (1916) the total number of cases under observation or treatment was 40. During the first year of the Demonstration this number increased to 195 and the total number of living cases, active and arrested, now under observation or treatment in Framingham or in outside institutions, is nearly 200. The total number that have been under observation during the period of the Demonstration, including lost cases, fatalities, etc., is at present approximately 295.

As stated previously, the ratio of known cases to deaths before the Demonstration averaged three or four to one. On a basis of the medical examination findings, this ratio in Framingham has been increased to nine or ten to one for active cases, and appromixately 21 to one for active and arrested cases. The same methods of discovery if applied throughout the United States with average uniform results would disclose for treatment something over one million cases of active tuberculosis, together with another million of arrested cases for modified observation.

The methods employed to discover tuberculosis in Framingham, both previously recognized and newly devised, may be summarily indicated as follows:

A. Previously Adopted Routine Measures

1. *Private Medical Practice*

The private practitioners in Framingham, numbering about 25, have of course continued as usual to report tuberculosis cases. The phrase "as usual" is somewhat misleading, for, under the stimulus of the work in Framingham, the amount of tuberculosis discovered and reported by the physicians, partly in coöperation with the Health Station staff, has been materially increased. During the decade 1907 to 1916 preceding the Demonstration, all of the physicians of Framingham reported on an average 13 cases a year. During the first year of the Demonstration, this number increased to 59. These are, of course, all active cases and for the most part more or less advanced cases.

2. *Tuberculosis Dispensary*

The tuberculosis Dispensary, under the supervision of the Board of Health, with the help of the tuberculosis nurse, has continued to operate, and has brought to light a certain number of cases.

B. Newly Established Routine Measures

1. *Medical Work in the Schools*

With minor and temporary financial assistance from the Health Demonstration, the official school committee of Framingham has provided for the public schools a practically complete medical, nursing and clinic system. This includes a full-time school physician, Dr. W. B. Howes, who had under him a school nurse, a dental hygienist, a part-time dentist, a dental clinic, together with informal arrangements for other clinic work in connection with the hospitals. On the tuberculosis side this has been very helpful, for the school physician during the first year of his work has discovered 11 cases of tuberculosis, active and arrested, in addition to 69 suspects.

2. *Factory Medical Work*

Entirely financed by private industry, about half of the industrial workers in Framingham have been under full-time medical, nursing, and clinic supervision, while an incomplete nursing and clinic equipment has been established for additional groups of employees. It is hoped that the future may see this work developed to cover most if not all of the industrial population, and, as already operated, the system has been helpful in bringing to light tuberculosis cases.

3. *Other Community Medical and Nursing Work*

Through the establishment of infant clinics, with infant welfare nursing, pre-school work, a summer camp for children, and other regular medical examination work, an additional substantial portion of the population has been reached on a routine basis with medical facilities.

C. Special Measures

1. *The Medical Examination Campaign*

In addition to the continuous provision of medical examination opportunities for all types of people in the community, the Health Demonstration has endeavored on several occasions, through medical examination "drives," to carry out "wholesale" examinations on large sections of the population. (See Monograph No. 4 of the Framingham series.) Physicians specially experienced in tuberculosis work, from New England state and private institutions, with the help of nurses, examined in the homes about 5000 Framingham citizens, largely in family groups. In addition, a thousand or more people have been examined through the Health Station office. These groups, combined with the examination work in the schools, factories, and elsewhere, bring the total number of individuals examined to date in Framingham to approximately 11,000, out of a population of 17,000. These examinations are representative of all age groups, and reflect all sectional, economic, social, and racial factors in the community.

In addition to valuable data regarding the incidence and preventability of minor and serious affections in general, this cross-section examination of a typical American community furnishes an excellent statistical basis for estimating the incidence of tuberculosis. In this work it was found that about one per cent. of those examined were actively tuberculous, and something over two per cent. tuberculous, including both active and arrested cases. The examination work was extremely productive in disclosing tuberculosis cases.

This work was, of course, relatively expensive and was justified mainly on an experimental basis, though it has done a great deal to stimulate the idea of medical examinations as an annual procedure in the community. It has encouraged people to go to their own physicians for a regular medical inspection, and has made the population sympathetic to the operation of routine medical examination work in schools, factories, and elsewhere. Indeed, while this type of wholesale medical examination work cannot perhaps be advocated as a procedure for all communities, it does serve as a basis for the establishment of routine medical work in the various groups, and is in its turn made unnecessary by the operation of this routine machinery.

2. *Expert Consultation Service*

Of all the devices which have been employed in Framingham, whether routine or special in character, for the discovery of tuberculosis, the consultation work stands first in importance and significance. It is in fact the object of this paper to emphasize in particular the advantages of this service and to point out that it is, in one form or another, an absolutely essential phase of tuberculosis work, antedating in time, and perhaps exceeding in importance any of the ordinarily accepted phases in the orthodox tuberculosis program.

The consultation work in Framingham grew out of the medical exami-

nation work. It was at first established on a part-time basis, but now requires practically the full time of one physician, namely, Dr. P. C. Bartlett, the Chief Medical Examiner and Expert Consultant of the Framingham Health Station. This work requires expert training in the field of clinical tuberculosis, as well as a generous portion of tact and ability. In Framingham, the services of the expert consultant have been offered to all of the physicians and are now used by practically all the men in active practice. The consultant's service is called for in doubtful or difficult cases of respiratory disease and to some extent in the general field of internal medicine. In addition to the presentation of this service to the physicians, measures have been taken of a popular nature to make known to the people the opportunity which the Health Station offered in this regard. The consultations may be held in the doctor's office, in the Health Station, or in the homes of the patients, and are provided largely on a free, though partly on a pay basis.

The advantages of the consultation service may be briefly mentioned as follows:

(*a*) The presence of an expert consultant, working in coöperation with the local physicians, examining patients for them, and handing over the patients to the care of the local physicians for treatment under their direction, serves in a sense as a measure for post-graduate education, this work offering opportunities akin to ordinary lecture, clinic and demonstration procedure.

(*b*) The work with the physicians tends to improve and standardize routine methods of diagnosis, classification, and treatment.

(*c*) The consultation service in Framingham has been of great importance in increasing the amount of known tuberculosis, both active and arrested, under observation or treatment.

(*d*) By removing in many instances the burden of diagnosis from the local physicians, it encourages the discovery of early cases. During the first year of the Demonstration, out of the total number of active cases reported, 42 per cent. were advanced, whereas in the second year of the Demonstration only 16 per cent. of those reported were advanced.

(*e*) It directly encourages tuberculosis reporting.

(*f*) It tends to improve methods of home treatment, and also increases the percentage of cases institutionalized, the consultant being a man fully familiar with the procedure and opportunities for hospitalization, and being in a position to advise regarding the best method of treatment.

(*g*) In many ways the consultation service supplements the other medical, nursing, and dispensary community machinery, and, with the routine medical work in schools, factories, and elsewhere, provides, on a permanent basis, the primary discovering machinery, essential to the efficient working of all other educational, treatment, and follow-up measures in the complete anti-tuberculosis program.

While this service is relatively expensive for a small community, it is believed that it may readily be established for larger population groups, possibly on a state basis, working either from hospitals and sanatoria, or under the auspices of the state departments of health or state tuberculo-

sis associations. Such a service, possibly on an itinerant basis, could cover in a regular way, on scheduled time, many sections and communities in the state most needing this service. Finally, this experience in tuberculosis work may have demonstrated an important device for application to other fields of medicine.

The experience in Framingham has indicated that tuberculosis exists to a greater extent in the average community than has hitherto been supposed. This is supported by the large number of active cases brought to light, mainly through medical examination work and consultation service. The use of these special methods for the discovery of tuberculosis has also demonstrated that most if not all of the tuberculosis in a community may be discovered and brought under one form or another of treatment or supervision, if looked for. It seems, further, that the average anti-tuberculosis program fails in not recognizing the opportunities and obligations in the field of tuberculosis discovery.

The special efforts to find tuberculosis have also shown that there exists in a normal community a large number of arrested cases of tuberculosis, cases that have been active in the past, and that must always be considered potentially tuberculous. Educational work aimed at the prevention of infection is of no value for this group, for they are concerned with disease, not infection. On the other hand, is not that also true for the great mass of the population everywhere? Will not, therefore, a complete tuberculosis program that discovers all types and conditions of tuberculosis in the community, point the way to a new basis for prevention, aimed at the control of tuberculous disease, rather than chiefly at the suppression of infection? This means for the future an educational attempt based on constructive hygiene, and an effort at health creation. It means, if not less attention to the death rate, at least more attention to the health rate, as measured by happiness in childhood, progress in school, productivity in industry, and general community vitality.

Thus our tuberculosis program merges into general health promotion. Thus do tuberculosis interests lead to a health program of the broadest scope. Thus may we be justified in teaching, not health for health sake, but health for the sake of a broader community life.

DISCUSSION ON PAPER BY DR. ARMSTRONG

Dr. Hermann Biggs, New York: I have been extremely interested in the paper. I think the points made by Dr. Armstrong in regard to the consultation service are of great importance. In New York State during the last few months in coöperation with the State Charities Aid Association we have been holding occasional clinics conducted by well-known tuberculosis specialists in various parts of the state. Preceding the clinic a survey is made of the town by a group of nurses, and all of the recognized cases listed. The physicians are interviewed and invited to attend the clinic and to send their patients. A good deal of publicity is given to the occurrence of the clinic. Any doubtful patients are invited to come;

physicians are asked to bring their doubtful patients, and one or more experts in tuberculosis are present at the clinic and make the examinations. These clinics have served an extremely useful purpose and have been very successful in a good many communities.

They serve the purpose, in the first place, of identifying a large number of cases that were not identified before, of putting them under observation and stimulating interest in the community, and they cause a great many more patients to go to their own physicians. They have an extremely useful influence in educating the physicians of the locality in the methods of the diagnosis of tuberculosis.

We have done the same sort of thing in New York State with reference to the venereal diseases, especially with syphilis. We have had clinics with demonstrations of the methods for the administration of salvarsan, by men who are highly qualified in this work. We have found that these clinics are very gladly received by the medical profession in the various localities in the state. We have held these clinics almost everywhere throughout the state demonstrating the method of administration of salvarsan and of anti-pneumococcus serum for the treatment of the type I pneumonia. We have felt that they were so useful that we have been trying to work out some plan that would amount to an extension of clinical work in general medicine.

I believe in the rural districts all through the country that if we could formulate some plan by which extension work in the diagnosis of disease could be placed at the disposal of the local physicians, if consultation work in internal medicine could be made available, it would be of the very greatest service in elevating the standard of medical practice.

I think all of us who have come in contact with the work of the public health laboratories, where they have been efficiently organized and administered, know that the public health laboratory has been a very highly efficient means for elevating the standard of medical practice. That was our experiment in New York City. I think that there is no factor which has come into medical life in New York City in the last 25 years which compares with the public health laboratory of the City Health Department (under the direction of Dr. Park) in elevating the standard of medical practice in the city; the same result has been attained in the state.

The development of the public health laboratory of the New York State Health Department has been really astounding in the last five years under the direction of Dr. Wadsworth. Now, if we could supplement this on the clinical side by clinical teaching I believe that the standard of medical practice in the rural communities in the smaller sections of the country would be very much improved. This is essentially what Dr. Armstrong has recommended and what they have been doing in Framingham in reference to tuberculosis, and incidentally, with reference to general medicine. I would wish to extend this method to cover the whole field of internal medicine.

A Member: May I ask Dr. Armstrong whether or not there was a study made of the number of children who were infected with tuberculosis? Recently, in a survey made in Jersey City, I found that we had

793 children, cases that were sent away to the local sanatorium, and among those children there were 67 per cent. who responded positively to the first von Pirquet test, children ranging from one to fourteen years of age. I want it understood that they were simply responding to the test, and of that number of cases, of the 67 per cent. of cases, we found 5.2 per cent. who had actual disease. I am very much interested to find out whether any statistics along that line had been taken in the demonstration at Framingham.

Dr. S. A. Knopf, New York: Dr. Biggs just reminded me of something concerning the value of following up the cases during our clinics throughout the state. I have personally had the privilege of holding rather large clinics, say, 30 cases in one day—working from morning to night, of course. I was surprised at the number of cases that came under my observation which had been once in a sanatorium and had left there apparently well, or had been diagnosed as arrested cases. Now, it seems to me that these clinics are of great value for the following up of the cases which have been in tuberculosis institutions and have been discharged as arrested or cured, but nevertheless relapsed. By the reëxamination of these cases and by giving them the proper advice we can prevent a good many from advancing to the second and third stages.

Dr. H. A. Pattison, New York: It seems to me singularly appropriate that Massachusetts should have been chosen as the state in which the experiment is being made, because it was Massachusetts that opened the first state sanatorium, and presumably those who were interested in that thought they had gone a long way in the campaign against tuberculosis. Massachusetts has found that the measures undertaken have been insufficient. It seems to me that of the weak links in our chain now, there are two that are very important. The first is that touched upon by Dr. Armstrong, the early detection of tuberculosis, and that, of course, is due to the lack of training on the part of the general practitioner and the lack of interest in the disease on the part of the general practitioner.

Some years ago, quite a good many years ago, John B. Murphy hit the medical profession between the eyes on the subject of appendicitis; gave them four or five cardinal symptoms by which it could be determined whether the case under consideration was acute appendicitis. If we could hit the medical profession between the eyes on the diagnosis of tuberculosis, we could go a long way. We cannot do it with a chronic disease like tuberculosis as Murphy could with acute appendicitis, but I have wondered if we should not in some way use such a list of symptoms as you will remember we used in the diagnosis of pregnancy with alliterative headings—the possible, presumptive, probable and positive signs—make up such a list of symptoms and hand it out to the medical profession and then, of course, amplify it with expository material and follow it up with this consultation service. There should be some way of directing the interest of the general practitioner toward the subject of tuberculosis, —having him think of this disease first instead of thinking of it last.

The other weak link in the chain is not a part of the paper, and, therefore, should not be discussed. I refer to the post-sanatorium care of cases.

At present, in many sanatoria, the care of the patient stops after he is discharged from the institution, and that is all that the sanatorium superintendent, perhaps miles from the city, knows about the case. The sanatorium should take care of the follow-up system.

But those two, it seems to me, are the weak links in the chain which we must strengthen, and which, I think, will be strengthened greatly by the suggestion of Dr. Armstrong for the consulting service. The plan is being spread. Illinois is doing it, Oklahoma is looking for the right man. Virginia is just making a start.

The Chairman: Surgeon F. C. Smith, United States Public Health Service, is a member of the Committee on Appraisal in Framingham. Will he discuss the paper?

Dr. F. C. Smith, New York: I have had only casual opportunity to observe the work which Dr. Armstrong and his co-workers have carried out in Framingham. I hope that it is one of many similar experiments which will be conducted throughout the country. Popular knowledge of tuberculosis is now arriving at a point where the subject is discussed with intelligence by the ordinary man and woman.

A man who is intelligent enough to run an automobile, a woman who can make a cake, a boy who can fly a kite, a girl who can be trusted with a crochet needle and a pair of scissors should know the crucial points in tuberculosis. Dr. Armstrong has capitalized the hard common sense of the ordinary man and woman in Framingham. He has demonstrated the importance of the coöperation and full confidence of the people in tuberculosis work. In that lies the safety of this generation. Every man and woman should be armed with the necessary facts for the prevention—yes, and for the early diagnosis of tuberculosis. Let us make them the colleagues of the doctors of to-day.

Dr. Armstrong: In answering the question as to the prevalence of infection in children, I might say that we attempted on a rather extensive scale to determine the prevalence of infection in children, and selected a group of about 500 children between the ages of one and seven years, performing upon them a von Pirquet skin test. In general, the results from this test showed that in that age group, about 33 per cent. of the children gave a positive reaction. The actual number of active cases among children has been relatively small in Framingham, so small that it has been impossible to make any comparison of a statistical nature that would be of any value. The few cases we have had have come, for the most part, from homes where there has been active tuberculosis at the time, or in the past.

There are one or two things in connection with that tuberculin survey that I think may be of some interest. We had previously supposed, on the advice of a committee of specialists, that a positive von Pirquet reaction in a child under five years of age usually indicated the presence of active tuberculosis; at least, it should be looked for very carefully. Now, out of 500 children, the most of whom were under five years of age, we found 33 per cent. with active von Pirquet reactions, while only one active case of phthisis was discovered.

Further, there was a very marked contrast in racial reactions. As is ordinarily the case, in Framingham the Irish and Irish-American stock show a much higher incidence of active tuberculosis than other race stocks. Our chief foreign-born group is Italian, which shows relatively very little active tuberculosis. For the community as a whole in the examination work two per cent. were tuberculous, active or arrested; among the Irish about five per cent., and among the Italians less than one-half of one per cent. were tuberculous. On the other hand, the Italian children tested by the von Pirquet showed a much higher percentage of positive reactions, the figure for this group being 51 per cent. in contrast to the Irish children with less than 30 per cent. positive. Does this mean that the von Pirquet, rather than being an indication of the likelihood of active tuberculosis, is in a sense a measure of the resistance to *active* tuberculosis after infection; does this mean that the healthier the infected child, the more likely you are to have a good, strong von Pirquet reaction?

EMPLOYMENT OF REST AND EXERCISE AFTER TUBERCULOUS PATIENTS HAVE RETURNED TO WORK

By HUGH M. KINGHORN, M.D.
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My object in presenting this paper is to see if we cannot improve the permanent results of patients who have been treated at a sanatorium or health resort.

The permanent results of the Trudeau Sanatorium,[1] the Adirondack Cottage Sanitarium, show that 61 per cent. of the patients discharged during a period of one to ten years were well and working. During a period of one to ten years the Laurentian Sanatorium[2] at St. Agathe des Monts, P. Q., Canada, shows that 57 per cent. were well and at work. In these two sanatoria the rest and exercise treatment was employed. No work therapy was employed. Dr. Joseph H. Pratt[3] of Boston employed bed rest treatment and treated his patients in the city. Fifty-six per cent. of his patients were well one to ten years after discharge. Pratt obtained his results in the homes of the sick poor in a supposedly unfavorable climate, and he made no selection of cases.

During a period of one to seven years the Sanatorium at Frimley,[4] England, shows that 44 per cent. of the patients were well and at work. Work therapy was used at Frimley.

These statistics very clearly show the value of rest and exercise treatment over work therapy. In these three sanatoria the patients were selected cases, and in my judgment the conclusion is well founded that rest and exercise treatment produces much more favorable permanent results than does work therapy.

When a patient leaves a health resort or a sanatorium and returns to work, he should still continue the open air treatment. All patients should repeatedly be warned that they have a disease which will tend to relapse if they do not take care of themselves. They should be impressed with the fact that the disease is rarely cured in the same sense that persons are cured of typhoid fever, diphteria or such other infectious diseases, but that it usually remains latent in the lungs. Such information has no depressing effect if put frankly to the patient and if he is told frankly at the same time that very many seemingly healthy persons have also some tuberculosis in their systems. This information is given to the patient so that he will never treat himself with the same disregard of his health as before his illness. He should be advised to work well within his strength, but never up to or beyond it.

When a patient is capable of resuming work, the physician must decide

upon the character and amount of work which he is able to perform. I have found that patients do much better when they undertake work which is not heavy muscular work. By muscular work I mean those forms of work which demand constant use of the muscles, such as garden or farm work, work in machine shops, carpentry, or heavy housework for women. Such heavy muscular work acts directly on the chest muscles and may tear adhesions in the chest or otherwise inflame the disease and is apt to cause over-fatigue. A number of patients undoubtedly resume heavy muscular work and remain well, but this work is dangerous. Patients are usually advised to get outdoor work, where they will get fresh air. Frequently, with such outdoor occupations, these patients will have to do a great deal of walking. This may produce physical fatigue and thereby destroy the patient's resistance. In my judgment it is better for the patient to have an indoor occupation which will not cause fatigue than to have an outdoor occupation which will constantly tire him. I think it is much wiser to conserve the patient's strength in every way, and for this reason I advise patients who had office work previous to their illness to return to their office work. They will do this work with much less effort than any other kind of work. Their work will be sedentary and they will thus conserve their strength. Whatever form of work they undertake they are always advised to work at easy pressure. They are instructed to have their offices as well ventilated as possible, and to have regular hours for meals. With those patients who belong to the laboring classes, and who were accustomed to use their muscles to earn their living, office work is, of course, out of the question. It is a difficult problem to find such patients suitable occupations. I believe that the very high mortality among them is due to the fact that they have to resume their muscular work to get a living. Their resistance again breaks down and the disease progresses. I advise this class of patients, if possible, to obtain occupations that will not require muscular work. They do remarkably well as chauffeurs. They should also try to live in healthful localities and not in cities. If possible those patients who are to return to office work should begin with only two or three hours of work a day for the first four or six months. From two to four in the afternoon they should go to bed, and from four to bedtime they should sit out in the open air and continue the treatment just as they took it at the health resort. At the end of four or six months after an examination by their physician, they can try a full day's work, if the physician considers this safe, or can work three or four hours in the morning and a few hours in the afternoon. They can then get the benefit of an afternoon rest of from one to two hours. It is quite possible for many patients to break into work in this way. Other patients are unable to do this, and must do a full day's work from the start. It is of the greatest benefit for patients to sit out on their porches and take the cure every evening in all weathers when they have returned home. This is one of the greatest means to keep them well, and it should be continued for several years.

It is safer for these patients to take as little exercise as possible for the

first year. The work of their occupation is quite enough, and unconsciously they will take a considerable amount of walking exercise. For at least several years after patients have returned home it is safe for them not to play golf or ride horseback. They should consider these exercises only when they have had a closed tuberculosis for several years. This refers to patients who had a well defined, open tuberculosis, that is, who had tubercle bacilli in their sputum. All patients, no matter what their occupations are, after they have returned to work, should continue to take evening cure if this be possible. They should arrange their homes so that a porch is available for them to sit out and take evening cure. They should be repeatedly warned to work at easy pressure and to avoid getting tired.

The failure to get permanent results among the working classes from graduated labor, caused Dr. W. O. Meek,[5] Medical Superintendent of the Brompton Hospital Sanatorium, Frimley, to study the chief factors which are responsible for such a rapid loss of working capacity in so high a proportion of cases. He points out certain directions in which there seem to lie opportunities for improvement in the treatment of this class of people.

I. The Return to Faulty Environment

The great majority of the Brompton Sanatorium patients returned to their work in London, the work at which they had broken down previously. Loss of condition and return of unfavorable symptoms frequently occurred very soon. In 1915 a special branch of the Almoner's Department at the Brompton Hospital was instituted to deal with cases discharged from the Sanatorium. A health visitor was also appointed. Homes were visited, arrangements made for the patient's return, help given where necessary, and patients were advised to report regularly to hospital, dispensary or private doctor. A fairly complete system of "after care" was thus constituted. A change to a more suitable environment was urged upon many patients on their discharge and with the assistance of the after-care department this was accomplished in many instances.

The following groups of cases demonstrate the beneficial result of such change of environment:

A. All traced instances of "apparent arrest of disease" and restored working capacity discharged in a certain year and returning to their former occupations in and about a large city.

B. All traced instances of restored working capacity, discharged in the same year, and who effected a recommended change of environment.

A. During 1915 a group of 32 cases, presenting important features in common left the Sanatorium. They all came from urban working conditions. In all tubercle bacilli were present in the sputum at the commencement of treatment; in none were they so found at its conclusion. The average number of lobes of the lungs in which any signs of disease had been noted was 1.8. They formed an excellent collective example of the "good sanatorium case," and were classified on discharge

as instances of "apparent arrest" of the disease. They all returned to the homes and working conditions in which they had broken down previously. The majority of the patients were of the distinctly better working class type. Their homes generally were clean and not obviously unsanitary, sleeping arrangements were satisfactory and wages good. The work to which they returned was of a varied character, but as a whole neither particularly arduous nor dangerous. All those still alive had been traced up to the latter half of the year 1917. Of these 32 people, at the time of the latest reports (averaging two years and a few months from the date of discharge) ten (31.2 per cent.) were well and at work and had kept so; five (15.7 per cent.) were "fairly well" and still at work; eight (25 per cent.) were alive, but unable to work; nine (28.1 per cent.) had died.

B. In the same year, 1915, out of a number of cases of relatively good prognosis, who were recommended to secure improved conditions, 44 were able to effect a change for the better. They were not specially selected as having only slight pulmonary lesions, for in a considerable number such lesions were quite extensive, nevertheless, they all appeared capable of doing a reasonably full day's work and to have a fair chance of maintaining working capacity in healthy surroundings. In all tubercle bacilli were present in the sputum at the commencement of treatment, in 23 they were still present on discharge; in 21 they were not so found. The average number of lobes of the lungs in which any abnormality had been noted was 2.2. All have been traced into the latter half of the year 1917. They form a group roughly comparable to the one analyzed above. Twenty-nine effected a change of both residence and occupation, five a change of occupation only, while ten found situations at their former employment in more suitable localities. Many made the change unaided except with advice; to others help was given in the search for work or in the removal of the home; for some situations were found, and for a few courses of instructions on motor driving, etc., were provided. Six joined the Forces. In most instances, the work and surroundings which they were able to secure were far from ideal, but constituted a marked improvement in their former conditions. Of these 44 individuals, after a lapse of time averaging a few months over two years and including one who was accidentally killed, 35 (81.4 per cent.) have remained continously well and at work; six (13.9 per cent.) are well and at work, but have had time off from work for illness and in four cases further institutional treatment; one (2.3 per cent.) is fairly well, but not at work; one (2.3 per cent.) has died.

These groups of cases illustrate the bad effects of a return to work in the city and the good effects when patients are placed under better conditions. It would further seem "that the attempt to return to working class life in cities large numbers of discharged sanatorium patients, who are, or have been recently cases of 'open disease,' may have to be abandoned as entailing great waste of life, labor and money." Dr. Meek considers the following alternatives: (a) greatly prolonged residence in sanatoria; (b) a long or short period of treatment, respectively

combined with or followed by training and subsequent start in suitable work in a proper environment; (c) the establishment of rural industrial centers in which patients could work at their accustomed, or more closely allied, branch of industry.

II. Lack of Provision for Prolonged Rest

Dr. Meek is strongly of the opinion that the working man who is obliged to return to full work immediately upon his discharge requires longer sanatorium treatment than any other class, and that in all but the really incipient cases two or three months is quite inadequate. With some sort of permanent colony for advanced cases in suitable surroundings and under constant medical supervision, the lives of many of these cases can be prolonged and a considerable number of them may reach good health.

III. Lack of Provision for Re-Treatment

Sooner or later a considerable number of discharged cases require re-treatment. Pulmonary tuberculosis is a relapsing disease. Prompt cessation of work and removal to healthy surroundings are called for. Delay may be fatal to the health of the patient and serious illness result. Improvement is most rapid and satisfactory under sanatorium supervision. Usually the admission to a sanatorium involves a long period of waiting. To avoid this, for several years the use of occasional beds at the sanatorium at Frimley has been employed for this purpose. The cases have been selected in the after-care department at the hospital, preference being given to those in whom the prognosis at the time of discharge seemed relatively good. These beds have already done excellent work, as the re-admitted cases respond rapidly.

IV. The Admission of Cases Unsuitable on Grounds Other than Medical

A number of patients are admitted to public sanatoria whose treatment results in failure on account of their bad habits or lack of will power or intelligence. In other respects they may be good subjects for treatment. They may respond well to treatment, but on discharge they quickly relapse. These patients form a considerable percentage of the total admissions and they always influence statistics adversely.

V. Need For Earlier Diagnosis

Unfortunately at present a large number of patients reach sanatoria with already advanced disease. Residence at the sanatorium does little or no permanent good to the great majority and their after histories are bad. Dr. Meek strongly emphasizes the importance of the working man's being able to consult the expert physician for diagnosis and advice. The sanatorium is the most suitable place to restore him to health and to teach him. These incipient cases retain their working capacity for very long periods after discharge from sanatoria.

CONCLUSIONS

From a careful study of the causes as to why sanatorium treatment has not produced more favorable permanent results, it would seem that the following should be mentioned:

First. An earlier diagnosis.

Second. A much longer period of treatment at the sanatorium. When we consider that the average duration of treatment is three months, it is remarkable that even the present results are obtained. We should devise means to increase the average time of treatment to six, nine, or twelve months or longer if possible.

Third. A more thorough employment of rest treatment with a careful use of exercise in the form of walking exercise when it is indicated and also of occupational therapy, and the non-use of heavy muscular work treatment.

Fourth. A greater care of the patients after they are discharged from the sanatorium.

I consider that these patients should not be allowed to return to hard muscular work, but that they should be placed in a suitable locality and placed at occupations which do not call for muscular work.

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DISCUSSION ON PAPER BY DR. KINGHORN

Dr. Charles L. Minor, Asheville: The problems which we have to meet in the relatively well-to-do and the working classes are different. With the working classes, who are obliged finally to return to more or less hard work to support their families, the French idea of a convalescent farm, which the Doctor has referred to, is the best of all things. It gives them a longer period to reach a more complete cure, and restores them to working efficiency, which too many of them do not reach during their stay in a sanatorium. I think the mistake that Dr. Kinghorn makes in giving his patients so much rest, is not that the rest in itself is not an excellent thing during part of the time, but that before the patient leaves the doctor, he should have passed the stage of rest, and *under the doctor's eye*, have taken up graduated exercise, finally reaching a considerable amount of walking, enough to assure the doctor that when he goes home, he will be able to resume his former occupation, for a patient who only goes home to be a chronic invalid is not a satisfactory result. Therefore, before the patient leaves the resort, I believe that he should do graduated exercises under the doctor's control, in order, as I call it, to be "workable" when he leaves.

Of course he must be so trained that we can feel sure that he will not return to cocktails and highballs and a giddy time, nor to an excess of over-work, such as Americans are prone to, but this is a question of the thoroughness of the doctor's teaching of the patient. To explain to my patients how they are to regard the question of their exercise, I quote them the story of the Greek athlete Milon of Crotona, who was so strong he could carry a bull up a mountain, and when asked how he did it, he answered: "It is easy enough, for I began to carry it up the day it was born, and have carried it every day since." In this way, if you will put your tax gradually on your patient, while he is under your eye and you are teaching him, this will be very well stood, and he will gradually reach an ability to walk for two or three hours over hills, without any effect on pulse, temperature, sense of fatigue, or weight. Exercise which can be taken in this way without any bad effects is a blessing and not a curse.

On the other hand, if he is kept in extreme rest for a long time, and then sent home, he is not only apt to get fat physically, but he is apt to get fat mentally. His mind gets a wrong cast. His psychology is bad, and his attitude towards his sickness a most undesirable one. I have seen some of them who spent their whole time lying on a sofa, afraid to move a finger lest they should get a temperature, and perfectly useless to themselves and their community, and such men I do not consider a credit to the doctor who treated them. Of course we can't follow them when they leave us. Therefore our teaching of them must be thorough, so that we can trust them, and our physical training of them must be so complete that we will know what they can do.

Fortunately, since golf is so popular, it happens to be an excellent game for these patients. They should be careful to go at it extremely slowly and to avoid long drives and full arm swings. Patients, who are trained in this way, when they go home, are hard and not flabby, with confidence in themselves, and not scared to death lest they break down again. They realize that the disease is not eradicated, but only incapsulated, and that folly on their part can bring it back.

There are several small points in their life at home that I like to insist upon. First, that they always have fifteen minutes of quiet before they eat their mid-day meal, and at least half an hour, or better an hour, of rest afterwards. Second, that they be in bed never later than ten o'clock at night. Third, that in the middle of the morning office hour, they take a glass of milk or some such simple nourishment.

Sleeping porches I do not consider essential, though where a patient has to live all day in a stuffy office, they are very desirable. While I warn them against over-doing amusements, amusements are very necessary, if their mental attitude is to be kept normal, and I give them a certain amount of liberty in this direction. Indeed, if they are cut off from amusements too much, they are very apt suddenly to boil over and do something very unwise. After all, as I like to tell my patients, success and failure in tuberculosis, as in everything else, is proportionate to one's ability to deny one's self pleasure for profit. It is just as the preacher tells us. Here lies pleasure, attractive and hard to resist. Here—duty, unfortunately

not always by any means so attractive, and hard to force ourselves towards. Pleasure may be dissipation, it may be work, it may be many things. If the patient is a man with a man's courage and backbone, he has got to learn to make the choice and to choose the wiser way. I am also very particular to insist on their using Sunday as a real day of rest, not on the bed by any means, but resting from all kinds of work, not going to the office to look over their mail, not taking part in the social amusements which are so popular on Sunday, and not automobiling on crowded roads where they breathe in everybody's else dust and injure their lungs.

What I urge is then, that while we use rest wisely, we should know when to stop it and use exercise under our own eye, before the patient leaves us.

Dr. S. A. Knopf, New York: I hope Dr. Kinghorn will explain once more the difference between work therapy and occupation therapy. Work therapy, as carried on in Frimley, England, has had the purpose of creating just enough tuberculin to be curative. Occupation therapy is what Dr. Billings described to us last night and is to my mind intended to occupy the patient's mind and to prepare him for vocational therapy. Both gentlemen who preceded me, told us that their patients either played golf or rode horseback for exercise. I have some patients who are so poor that they can neither play golf nor ride horseback. What work or occupation therapy are you going to prescribe for them? Many of my patients have not even a porch to sleep on. In New York, for example, the majority of the patients live in the tenement house districts; they have no porches, they have only fire escapes, and the law does not allow them to be utilized for sleeping purposes. This regulation is necessary, of course, because of the danger in the event of fire. When other outdoor sleeping devices are not available the window tent renders great services.

Now let us return to our occupation therapy. Dr. Minor tells us that he instructs his patients to exercise so many minutes and have their watches handy to exercise precisely the number of minutes he has prescribed. This is excellent and I admire his wisdom and fine judgement in being able to know beforehand exactly the number of minutes his patient can walk. Since, as already stated, many of my convalescent patients neither ride horseback nor play golf, I tell them to walk, and not being as wise as my friend Minor and able to tell the exact number of minutes to prescribe for them, I tell them to start to walk when they don't feel tired and to stop before they get too tired. I tell all my patients that if they possibly can afford it to rest fifteen minutes before luncheon and dinner and half an hour after luncheon and dinner. Alas, when the workingman resumes his regular occupation he can rarely do that! My wealthier patients, and I have a few, who can afford a lounge in their private office, I tell to lie down several times during the day and relax completely, if it is only for five minutes at a time. Lastly, I tell my patients who must work all the week to stay in bed all day Sunday, or at least all the forenoon, and instead of going to church to commune with their Creator in bed.

Before I order my patients to do any physical labor I examine the con-

dition of their muscles. If they are flabby, approaching atrophy, fatigue poisons will be created all the sooner and in greater abundance. These fatigue poisons are injurious to anyone, and particularly to the tuberculous. I want to impress upon you the value of examining the muscular system prior to allowing your patient to perform physical labor. We all know that there is nothing better in the whole wide world than complete rest on the back for the patient who is actively tuberculous. We do not even allow him to breathe deeply, as long as there is any serious activity in the lung. The moment that his lesions become quiet, I agree absolutely with Dr. Minor, that you should let him begin to walk or work gradually. But before letting him do any physical work, I advise massage for about three-quarters of an hour every day; after a week or so, every other day, and then twice weekly until his muscular condition is improved. Masseurs charge two or three dollars for such treatment. Poor people cannot afford this. Forgive me if I repeat a suggestion I made in this section at a previous session. We should all know how to massage and how to teach it. We may wish to teach it to our nurses and in the families of the poor to a well and willing member of the family who is intelligent enough to massage the sick member. It is no great art; it is easily taught and practiced. Friction in the direction of the venous system is the first movement, then kneading the muscles as one would knead dough, then tapping them, and then gently stroking each member of the body. By adding massotherapy to the valuable therapeutic instructions given to us this morning by Dr. Kinghorn and Dr. Minor, and teaching all patients when to rest and when to exercise, I think we shall succeed in helping not only our rich, well-to-do patients, who can afford to ride horseback and play golf, but also the laboring people who are, after all, the majority of our patients.

Dr. Samuel H. Watson, Tucson, Ariz.: If we are to follow out the recommendations of Dr. Kinghorn, it seems to me it means that in a majority of our patients we shall have to change their occupations, a thing I do not believe in doing. I heartily endorse everything Dr. Minor said about having our patients under our control for a sufficient length of time to get them in workable condition. I believe if we are able to do that, then we do not need to bother so much about what occupation they pursue after we send them back to work (unless it be some particular occupation which is distinctly deleterious, such as that of marble-cutter, miner, or something of that sort) provided we have them get plenty of fresh air and plenty of rest during their non-working hours.

I think almost everyone is going to be able to do best and easiest that work which he has been used to doing, so as I said a minute ago, if we adopt the recommendations of Dr. Kinghorn, it means in a great majority of cases a change of occupation, which is exactly the very thing to be avoided.

Dr. E. E. Watson, Salem, Va.: I wish to add my hearty approval to every word that Dr. Minor has said. After all, the treatment of tuberculosis resolves itself into a question of common sense. It seems to me that Dr. Minor hits the happy medium. A few years ago I was content to turn my patients away from the sanatorium, fat and running no symp-

toms. They made a very favorable impression when they returned home. But I watched those patients for two or three years, and I found that the end-results were not satisfactory. They broke down.

Now, in recent years, mainly through the teaching of Dr. Minor, I have tried to keep my patients sufficiently long to allow them more freedom and more nearly to live the life, under my supervision, that they will have to live when they return to work. In other words, if I have a patient who, when he returns home, can take a few hours' rest a day, I have him do that. For instance, I have a man who has to go back to bookkeeping, or any vocation requiring him to work from seven in the morning till five o'clock in the afternoon. If I can keep that man long enough my plan is as follows: I usually begin with at least three months' absolute rest, and longer if necessary, because I believe just as much as Dr. Kinghorn does in absolute rest in the beginning of the disease, or as soon as it is diagnosed. Then after two or three months in bed, and after he has lost all symptoms, I have six months to get that man gradually to the point where I can stop him from taking his after-dinner rest for more than half an hour, and I keep him up from eight o'clock in the morning till six o'clock in the evening. If he can do that and stand up under it under my careful supervision, that man certainly has a better chance of going home and remaining well than if I had made him keep all the rest hours and limited his exercise right up to the day he was discharged.

Dr. L. Rosenberg, Liberty, N. Y.: I am very glad that Dr. Kinghorn gave his address for I think he has effectively destroyed two medical superstitions. First, with reference to not carrying out the treatment as practiced at Frimley. Dr. Kinghorn showed us that the very poor results at Frimley justified many of us who had refused under pressure to introduce the hard work in the sanatoria with which we were connected.

Another important point that Dr. Kinghorn made was with reference to the fetich of outdoor occupation. I do not suppose that there is an outdoor occupation that is entirely suitable for a tuberculous patient who has been through a sanatorium course, unless that patient is a man of means and can go to the races or the seashore and enjoy himself. Most physicians are not situated like Dr. Minor and Dr. Kinghorn; we have to treat the poor. With us, the after care of the poor is a very severe problem.

I have thought over these matters for many years. I have stated over and over again, when I addressed patients and other lay audiences, that in my opinion the majority of people who succumb to tuberculosis do not succumb because of tuberculosis *per se*, but because of some defect in their character. The prime requisite for tuberculosis is strength of character, really more than strength of body. The allurements of the city, among other things, will do much more harm than returning to the same occupation. Upon that phase of it, perhaps my experience is a little peculiar. I deal largely with people engaged in the garment or similar trades. It is one thing to tell an educated lawyer or business man that he should change his occupation; he can in most instances readily do so, for he is a man of resources mentally and financially. The

artisan or worker in the shop has usually learned but one thing, and to take up another occupation is a severe strain. I have frequently found this strain of sufficient importance to nullify any possible hygienic superiority in the new work. I usually advise patients to return to their former work, everything being equal, because the average work day consists of only eight hours and it is during the remaining sixteen hours that the mischief is most apt to be initiated.

Dr. W. McN. Miller, St. Louis: You might infer from the state from which I am credited as coming that I come to be shown. I am not disappointed; I have been shown. In the discussion of these papers pertaining to occupational therapy one clear thought which I have gathered is that distinctions are to be drawn and relations to be determined as between work therapy, occupational therapy and vocational training.

It is clear from what I have heard, that two factors are to be considered in occupational therapy; one of which appears to be purely physical—typified in therapeutic work and exercise, another is psychic—typified in vocational training. In practice, these factors act and react one upon the other beneficently.

The psychic factor appears to be the one which appeals most strongly to the practitioner in treating pulmonary tuberculosis. It is a well established fact that tuberculous patients are alternately filled with hope and despair; they are, as it were, afloat on the sea, uncertain whether now to strike out for the shore or now to sink to the bottom.

Physical exercise and work are employed therapeutically to increase resistance to the tuberculous process, vocational instruction is employed to qualify the individual to meet social demands—those of the family, of kindred, of the community—in meeting which he will be rewarded in profit, wages, salary, affection or in the fulfillment of some ambition which he may hold.

The tuberculous patient is still human; he still looks forward to what his future may bring. It would seem to me that the essential consideration in occupational therapy is the overcoming of the patient's despair, the giving him hope that he may come at last to the shore. This, it seems to me, whether psychic, physical or mixed, is the first thing for us to consider.

But it is not all psychic; in this connection there is still the physical factor to consider. If we inspire the patient with hope, we have given him confidence; if he has confidence he will follow instructions and endure living up to the hard therapeutic physical regimen which is laid down for him, hoping that in the end he may attain that goal for which he and we strive in life.

Dr. H. L. Rockwood, Cleveland: We have in Cleveland attempted to work out a system of occupational supervision on all our tuberculous cases by the employment of a full-time occupational supervisor who takes the patient as he leaves the sanatorium and attempts to place him in an employment suited to his condition. We find, contrary to Dr. Kinghorn's statement, that a man cannot go to an employer and ask for any

particular amount of allowance depending on his physical condition. He must take his place with all other laborers.

We have an employment secretary whose duty it is to be so much in touch with employment agencies generally, so well acquainted with the industrial workers and employment managers that he can secure for this case, when necessary, the necessary allowance.

I think these three or four papers on this subject have emphasized the fact that there are several points of view. There is the recreational, the economic, and therapeutic. These are three points of view concerned. Of course in clinical work we are principally concerned with the therapeutic, but the average case is 26 or 30 years of age and he has no bank account, and the economic is perhaps the most important. We must work out a system which will combine these two principal factors.

Now, in order to choose cases at the sanatorium or at the institution who can work themselves up to a sufficient degree to be physically able to go into the labor world, we have attempted to conduct mild gymnastic exercises for thirty minutes each day on selected cases, taking the temperature, pulse and respiration before and half an hour after. We selected just the mildest "setting up" exercise that could be secured, and we carry it on thirty minutes daily, except Sundays. We made up our minds that we would do nothing further along this line until we had 100 cases that had passed through those exercises 90 days. I want to say that we have not reached 100 cases, although we started fourteen months ago.

Although I have been working in this work six or seven years now, constantly working with tuberculous cases, I find that you cannot pick out, in the moderately advanced cases a man who can do that much work and do it consecutively every day for 90 days and not make some mistakes, at least. I have been surprised to find that I have made a great many mistakes.

Dr. Kinghorn: When a patient returns to work he should be able to work. We all see the value of that; it is absolutely necessary. I think Dr. Minor has the impression that I carry the rest treatment until the patient returns to work; that I do not supervise his exercise during the time that he is under my care. My treatment is the rest and exercise treatment combined; it is not solely a rest treatment; it is a rest and exercise treatment. I do not allow a man to return to work until I think he is able to go to work; before he goes to work he is trained up slowly on exercise. Dr. Minor will begin with a one-minute walk, probably, and I may begin with five. I want to draw a distinction here. A great many physicians, I think my friend Dr. Minor, too, place too much stress on the muscles, not putting stress enough on the foci of disease. It is the foci of the disease that we are treating, not muscles. I do not let patients over-exercise, but I do watch the foci of disease. It is the focus of the disease that I am trying to cure. When patients return to work I try to guard the foci, so that the phthisis will not again break out. I watch the disease by examining the lungs. It is an organic disease that you are treating; not muscles. Dr. Minor will allow patients three hours' exercise. I say that is two hours too much.

I feel very strongly that these patients should be safeguarded in every way. We cannot risk a relapse. I know of a case at the Adirondack Cottage Sanatorium who was counted as a comparatively cured case. This was years ago. The day before he was to leave, he climbed a mountain, and what was the result? A violent hemorrhage and death. When patients are at their maximum amount of exercise, I advise them to take not more than forty minutes exercise at a time. They may take forty minutes morning and afternoon, and sometimes also in the evening. They may in rare cases take three hours in the day; not three hours at a time. I try to avoid the risk of having any exertion that is going to do any harm to the focus. I prefer forty minutes to an hour. Patients may take an hour, but never with my advice.

The psychic question comes with the rest and exercise treatment. Some patients get into the condition where they are public nuisances to everybody. It is very rare that many of them will remain so. It is a question whether these patients are not psychically deficient anyway. They are not quite sound. But when the majority are able to return to work I do not pay too much attention to them. I know this, that their friends will get so sick of having them around doing nothing that finally the patients will come to a realization that they are well enough to work, and then they will go to work.

Dr. Knopf has mentioned work therapy, graduated labor and occupational training. By graduated labor I mean the heavier muscular work that the laboring man has to do. I am absolutely opposed to this. Results prove that graduated labor is not to be compared with the rest and exercise treatment. Work therapy, I think, should be restricted to the light forms of hand work that patients can do,—typewriting, basketry work, and those things. I think Dr. Watson has a wrong impression of what I said about returning them to work. I believe I mentioned it when I read my paper, that the patient will do his own work much more easily, —I am referring to the man who goes into an office,—than any other form of work. I always advise a man, if possible, to go to his own work. The figures which I gave in my paper show that the laboring man should not go back to his heavy, muscular work, but he should have a lighter form of occupation in a favorable environment.

TREATMENT IN TUBERCULOSIS

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An Abstract with notes on Morale and Reconstruction

Socially and economically the treatment of tuberculosis is prophylaxis, and the solution of the great world problem will be prevention. When every human being and his children after him shall be cared for in wisdom every hour from date of conception, then can discussion of treatment in tuberculosis be omitted. Till that millennial day there is need of advancing every means for efficiency in treatment of the Great White Plague.

Treatment therefore, as we now consider it, will mean of the relative little which will be left after prophylaxis has accomplished all that could and should be accomplished. Treatment is the management of surgery and medication, the artifices of man, and the management and control of the natural agents, food, air, rest, and exercise.

These are the material factors in treatment,—well known, simple, discussed till threadbare, accepted as standard, and fairly comprehensive. Yet these can be reconsidered with advantage, not only to get the changing viewpoint of the student, but the actual working out of previously accepted means of treatment among the large bodies of men in our military hospitals. It must be that we have learned something about tuberculosis,—possibly something new, but a surer and clearer knowledge of many things we believed before. We have had the opportunity for continued military control of these patients who need control, and when they need control. We hope it is made clearer to the medical profession why a tuberculosis patient needs a controlling authority outside his own will. But we have proved only what was known before,—that the greatest factor in the treatment of tuberculosis is "morale."

And if in this classification of agents in treatment I omitted "morale," because intangible, I should be prejudicing its relative importance. The term "morale" is often used meaning "esprit de corps" of a hospital or a military unit, but in this connection we mean more,—the psychic response of each patient to teaching.

The control of tuberculosis in the War Department has brought a standard of diagnosis never before known to a larger number of doctors than ever were specialized in two years. Before the war a report of physical examination of the chest had little value other than due to the standing reputation of the examiner. But now, the army form "55g," signed by a tuberculosis examiner or ward surgeon, carries an accurate definite statement of physical findings which can be interpreted into diagnosis, regardless of the identity of the examiner.

A standard of diagnosis naturally is followed by a standard of treatment. This is in the process of evolution, for the end is not yet. This standard has been obtained largely by elimination, by discarding the irrational or useless. Evolution does not mean destruction alone, and negation must not symbolize the end of scientific or rational study in therapy. Instruction to do nothing is depressing in mental effect. Scepticism gets nowhere. Treatment must be affirmative, and patient and physician can truly be inspired by results. Let us appreciate that treatment has not been narrowed in tuberculosis hospitals but extended in scope.

We are learning the advantage that comes from continued "hold" over a sometimes irresponsible patient. We are learning the new and the true in reconstruction—occupation versus hospitalization.

We are teaching more universally that the acquisition of immunity to tuberculosis comes to us through a one time infection with tuberculosis; that this is not necessarily an evil but nature's way of protection; that there is small need of tuberculin for 90 per cent. of us already are tuberculized. Therefore the safe acquisition of tuberculosis immunity is the most important therapy for all whom prophylaxis cannot protect. And if prophylaxis can prevent a massive infection—too large a dose at one time—it will have accomplished more for the safety of the individual than in an attempt to shut the door of the world so closely that no contact with tuberculosis will be possible.

TREATMENT

A. Surgery

The treatment of pulmonary tuberculosis could not be considered without an acknowledgment that the treatment of the other forms of tuberculosis is largely surgical. Bone and gland tuberculosis, so common in early life, must be called surgical diseases, even if treatment by open air and feeding is necessary. The earliest fatal form of tuberculosis is meningitis, in which we can only lament the failure of prophylaxis, but the other forms of later childhood in glands, bones and joints give a wonderful opportunity to the surgeon. Of the very positive and beneficent results of operative surgery in such cases we can speak with keen appreciation. When a tuberculous focus or massive glandular deposit can be removed safely, who can dispute its wisdom? The removal of infected cervical and axillary glands, of a tuberculous testicle or even a kidney, are striking demonstrations of ideal treatment,—absolute destruction of the concentration camps of the enemy.

In pulmonary tuberculosis, aside from complications and from pleuritis, which may be classed as tuberculosis, little surgery has been attempted. The operation of artificial pneumothorax is the only conspicuous operative procedure practiced on tuberculous lungs. It is the proper and logical treatment for cavitation with hemorrhage in a single lung where the other lung is capable of carrying on respiration. Like other surgical practises it has been done unwisely and for this reason was not unquali-

fiedly recommended in general tuberculosis treatment by the War Department. It has strikingly and promptly given months of life in comfort to very many patients and in certain carefully selected cases been a factor in cure. This treatment should be in the hands of competent tuberculosis experts and it should be distinctly understood by the patient that frequent and continued repetition would be needed under observation for many months.

B. Medication

It is well for us first to understand where treatment is directed to increasing the resisting power of the patient and his general strength that medicine can play little part. Resistance must be constant and continuous, hence,

(*a*) *Stimulants and tonics*, which are temporary in effect and may be followed by reaction, are useless except as aids to appetite.

(*b*) *Specifics*. Their day is past, yet we find a popular demand for cod liver oil, creosote, iodine, hypophosphites and glycerophosphates, all of which medications are ethical and in selected cases helpful. They are not here condemned but no one must be misled into believing them cures for consumption. There is no good reason for taking up time and space in the consideration of their relative values.

(*c*) *Digestive Aids*. Anything which really helps appetite and digestion is of material assistance. There are many mild, agreeable, bitter and appetite-enhancing preparations of which each physician has his own favorite. None should be given continuously. And we must admit that well cooked attractive food, tasty service, pleasant companionship, and a cheerful mind are the best medicines in the long run for promotion of a high degree of food sufficiency and efficiency.

Over-acidity should be corrected and the use of soda and magnesia in various combinations cannot be condemned unless they are continued, when a change in dietary would bring about proper gastric secretion.

There is a quite common anorexia in active febrile tuberculosis which needs only absolute rest in bed in open air and cessation of forced feeding for improvement. All functions need rest.

(*d*) *Laxatives*. On account of the tendency to overfeeding, there is a greater need of laxatives, and no intestinal toxemia must be allowed to develop. The regular daily action of the bowels must be maintained in as normal a manner as possible. It can be left to the good judgment of the physician to adapt to the patient that agent which is least disturbing to digestion and least likely to be followed by reaction.

(*e*) *Astringents*. Diarrhea is an alarming symptom. Be sure it is not due to faulty feeding, and correct all causes for functional overaction. Intestinal ulceration as a terminal complication is often symptomless. When confident that tuberculosis is the only cause for diarrhea, be prepared for a rapid loss of weight and strength. Digestion and assimilation are so essential in tuberculosis that when they weaken the last defence is gone. "*Descensus in Averno facile est.*" Treatment has been extensive and

varied. Many remedies mean useless remedies. Morphine and bismuth remain standard, though bismuth is even of little use.

(*f*) *Cough.* In tuberculosis, it must be taught that coughing is a harmful and improper act; that it can be controlled and that it is an evidence of mental weakness not to control it. This is especially true in institutions where one patient reacts upon another. It must be intelligently explained to the patient why he should not cough and how he can control it, with specific instructions in method of control. If, despite this, there is cough, what is the best medication?

My personal direction has been hot water as hot as it can be sipped. Do I succeed in limiting all cases to that? By no means. It is not always convenient, but the nearer any medication is kept to this standard of simplicity the better. Aromatic spirits of ammonia with glycerine is in popular use with my patients. The rest from a racking cough that is obtained by codeine and other morphine derivatives is undeniably beneficent and is occasionally necessary, but the widespread evils from doping a cough are so manifest as to need no statement here. When death is sure, relieve all pain, assist sleep. Scientific treatment is past. Let the "quality of mercy" be not strained.

(*g*) *Hemoptysis.* Hemoptysis causes the greatest fear and alarm. Convince the patient that it always stops when vascular tension relaxes. In ordinary cases assurance is enough; no medicine is necessary. Nitrite of amyl is in popular use in all military hospitals. It at least has a good psychic effect. If hemorrhage continues, use morphine, one-fourth grain hypodermically, once only. Repeat effect if desired with bromide of soda. Artificial pneumothorax is the only radical treatment and is permissible as before described.

C. Food

You have little need to teach good feeding in America. If there is any one idea in treatment which the public has grasped it is good feeding. In fact you must be on the watch for overfeeding. There is nothing to be gained in crowding down a second meal while the stomach is still at work on the first. On the other hand, when combustion is great under forced draught, a larger amount of fuel is burned.

An eminent authority said before the war, "Tuberculosis patients cannot be treated like soldiers in the army." But we are treating them in the army with surprisingly good results. What is the army hospital rule of diet? Simply and universally, "Three meals a day." All rules have exceptions, and milk or egg nogg may be added at bedtime only. Limited liquids can be given more frequently.

Highly nourishing liquid foods, quickly available in the circulation, are popular, but the judgment of the physician in each case must direct. While eggs and milk still remain the most valuable articles of diet they must not be given "ad nauseam." As tuberculosis is a disease which should remain under treatment a year at least, we must anticipate the fact that even a normal person tires of routine, and not create a disgust for valuable foods necessary in the future. In private practice it should

be easy to change the menu frequently. In sanatoria it must be done though we personally realize the greater difficulties in avoiding sameness of diet. It is a matter of wise nursing which need not be mentioned, that the patient should not be coaxed in constant consultation, but should have the tonic effect of surprises in diet. We differ in tastes and no rules can be laid down. Some patients can drink milk freely for excess nourishment, some cannot. Many prefer buttermilk and find it more appetizing and digestible.

More food can be taken when one is in the open air, so *open air life* is necessary to good digestion.

D. Air and Climate

The general public appreciates the advantage of pure air as directly concerned with its effects upon diseased lungs, but does not realize the assistance to appetite and digestion. The atmosphere in different areas and altitudes has been studied in its effects upon tuberculosis until this result is established: that atmosphere and that climate are best in which one can live in the open air *all the time* with the greatest happiness and comfort and with the least expense of personal energy and means. In southern California the Creator is worshiped for having granted them the only perfect climate. At Denver and Colorado Springs they are sure nothing could be more health giving than the clear atmosphere of their high altitude. In Arizona we believe their convincing statements of the advantage of their dry climate, and in North Carolina and Florida we hear the advantages of mild climates and lower altitudes. In fact our education in climates has been influenced by the local "boomer" and advertiser. And now on our northern mountains, from Maine to Washington, we build our sanatoria and even boast the advantages of refrigeration in tuberculosis. The fact is we all are right.

E. Exercise

Exercise is a factor in treatment much discussed of late which, used unwisely, is more dangerous than drugs. When a tuberculous patient can without injury do any work he should do it. It is better that he should gain the confidence of doing it. He must not be allowed to feel that, on account of his prolonged rest, he is labelled "useless." The disease is bad enough without having the stigma or associations ruin the usefulness or happiness of a life. The army plans to avoid the unnecessary chronic invalidism which has hitherto been too common and is doing a wonderfully philanthropic work in teaching men a better, safer, and often more remunerative occupation. It is also teaching occupation therapy with proven success.

Occupation of mind and muscle is a therapeutic factor in chronic diseases of greater importance than we have recognized. There has been an endless discussion the past year over when to change from rest to exercise. The line of demarcation has been indicated by the subsidence of pulse and temperature to normal, but no rule is absolute. Some mental occupation and even handcraft may be wise before the temperature is

normal, especially after a long restraint in bed. But a pulse or temperature response, or display of nervous excitement in manner, are quick contra-indications.

Some of us are more conservative than others, and feel that a few weeks "playing safe" is time well spent. However our well trained staff of aides begin the therapy of occupation under medical advice, so gently and gradually, that it may be likened to the process of normal growth. And many men will show improvement in symptoms with a renewed interest in life, and a desire to help "play the game."

Those of us who have been in a position to report on relapses observe that errors have been made in abbreviation of initial rest, or in too prompt return to activity, at the insistent demand of the patient. Physical signs and symptoms, certified by the attendant, must remain the guide, and not the patient's desire. The man who does not wish to do anything, and who is losing interest in life, is the one needing the valuable assistance of the trained aides, furnished by the Reconstruction Service. After all, exercise is secondary, for it follows initial cure, and initial cure requires rest.

F. Rest

Tuberculosis has been said to be a disease of the *poor* and overworked. We know it is also a disease of the *rich* and overworked, therefore overwork is the common factor. A continuous temperature elevation requires rest. A quickened pulse requires rest, and rest should be absolute. *Absolute* rest can be had only by *absolute* control. Whether military or moral there must never be any doubt in the patient's mind about obedience. Many a tuberculous patient exhibits an exaggerated mental activity, even prides himself upon it, or thinks it proof of his peculiar disposition, and tells how "nervous" it makes him to stay in bed, honestly thinking the bed tires him because weariness overpowers him in bed, after the nervous strain has relaxed. In private practise it is almost impossible to secure obedience from women as well as from men. Remark to a woman who requires *only* rest for treatment, "You need one thing to cure you—a broken leg, and if I could do my whole duty by you, I should see that you had it. Six weeks in bed will cure you, and nothing but a broken leg will make you stay in bed six weeks." "Well I will keep real still six weeks." And when you call again she will have on a dressing gown entertaining a caller, and you drive her to bed. Next time you see her, she will be sitting up in bed, reading a novel, that furnishes the mental excitement she craves. You recognize this as a common experience showing the difficulty of control in private practise. You must figuratively knock such a patient down with a club. One with a broken bone knows he must keep it still for it to heal, and knowing it, mentally acquiesces in keeping still. One with an injured lung should know as much,—if he does not, teach him. I cannot put too much emphasis on the need of rest in active tuberculosis.

The greatest function of the physician is the maintenance of an unfailing *morale* in hospitals or out. Psychical contact, the personal touch, is

needed. The aim is not to amuse the patient, or please the patient, or to camouflage the situation, but to provide a constant personal demonstration that you know the road to health, and you know it gets there. Start if you please on as clear a statement of physical condition as the intelligence of the patient will permit, and keep going ahead with him. Do not go back to the detail of morbidity. It is a healthful exercise for all of us to look ahead, and not back. Every tuberculous patient is going to die. So is every non-tuberculous patient, so are you and I, but this does not mean that we shall turn around and gaze at that abyss of non-existence from which we once came.

To show the road ahead to tuberculous patients, we must walk it ourselves. There *is* a philosophy of life. Teach it, practise it, for the tuberculous patient who practises this philosophy will live, while one who is overwhelmed mentally by constant fear will die, other things physically being anywhere near equal.

Our failures in tuberculosis are first: failure to look for the simple signs. When found, failure to return to the first principle of life which we practised as infants: *rest—feeding—feeding—rest.* Begin at the beginning to reconstruct life.

DISCUSSION ON PAPER BY CAPTAIN SYLVESTER

Dr. S. A. Knopf, New York: Captain Sylvester who gave us a splendid paper mentioned pneumothorax as most valuable in the management and treatment of chronic pulmonary tuberculosis and particularly in the control of pulmonary hemorrhages. I agree with him in this. He also stated that he tells the patient about the wonderful results which can be obtained by artificial pneumothorax. I would wish to add here a word of caution. When telling the patient that you are going to perform the operation of pneumothorax, tell him that you are not positive that it will be possible to get into his intra-pleural space, which means that you are not sure that you will succeed with the operation. I do not always succeed. I do not know whether our chairman, our secretary, the captain, or others are always successful. I have often failed because of extensive pleuritic adhesion.

I do not believe in over-feeding our patients. The proper thing is to keep the patient at an average weight; perhaps a few pounds over his average, but not more. Do not attempt to fatten your patient up and retard his recovery by adding intestinal complications.

I thoroughly disagree with the speaker when he says that a patient should never cough. I tell my patients, "You must not cough when you have not any expectoration coming, but when you feel that you have a lot of accumulated sputum, I consider it your duty to cough and to expectorate, because in this way you get rid of the fever-creating material." Cough with expectoration is drainage. The patient, by getting rid of accumulated mucus which in the tuberculous may contain thousands of bacilli and pus-secreting organisms, will feel better than if he should attempt to suppress cough and expectoration.

I should like to mention hydrotherapy as a very important measure in the treatment of tuberculous soldiers as well as civilians. I was glad to find that one of the Government hospitals is particularly well equipped for physiotherapy. I refer to the one in Denver, known as the Recuperation Hospital. Besides all possible devices for vocational training, I found a very elaborate hydrotherapeutic establishment there.

Lastly, one word about psychotherapy, which is next in importance to physiotherapy. By judicious psychotherapy the patient's mind is kept in a hopeful condition. This must be done in military as well as in civilian hospitals, with the poor as well as the rich. I learned in my early days that you cannot make the patient cheerful if he thinks that his family is suffering at home. As examples I will recall two instances which I shall never forget in my life. When serving as assistant in one of the larger European sanatoria I had in my division a man who suddenly began losing weight in spite of suitable feeding. He had good digestion and had enough to eat. The good old professor and physician-in-chief to whom I went for advice told me to find out whether there was anything the matter with the soul of the poor man. I discovered that he was worried because on account of his having been in the sanatorium longer than his employer had stipulated, his private pension had been cut in half. He knew that as a result of this shortage of income his wife and children were almost starving. A second experience which taught me to inquire always tactfully into the finances of the patient was as follows: In my early days as a tuberculosis practitioner I was attached to one of the first tuberculosis dispensaries in this country. A young man came in; I examined him and made a diagnosis of pulmonary tuberculosis. I gave him as good advice as I knew and told him that he was underweight. I gave him dietetic directions and told him what to eat so as to improve his weight. I even gave him a tonic for that purpose. After two weeks he came back and he weighed less than before. When I questioned him he said: "I have not had anything but crackers and a little milk as my daily diet all this time. I am absolutely poor, and I could not afford to eat the way you instructed me to eat." Now I inquire into the financial condition of all patients, but particularly of dispensary patients before giving a diet list.

This is psychotherapy. Whether you deal with a rich or a poor patient, try to remove the cause of his worry if you can. If you have a tuberculous patient who ought to do well but does not and you cannot find a physical cause, do not forget that worry and anxiety are antagonistic to the cure of tuberculosis. In other words be a physician of the body and of the soul.

Dr. Le Roy S. Peters, Albuquerque, N. M.: A proper discussion of the treatment of tuberculosis would require a great deal longer time than we have at present.

The question of treatment is very ably covered by Captain Sylvester. However, I think that no hard and fast rules should be laid down for the treatment of any given case of tuberculosis. A man in tuberculosis work who follows a given routine will usually go astray. It comes back to the old question of common sense. If a doctor will use common sense in the

treatment of tuberculosis, he will get much further than the average man who writes down certain laws that must be followed in all cases.

I think the majority of us, in beginning our work in tuberculosis, go through the stage where we try all the known specifics and various drugs that have been advocated for the cure of the disease from the time the world began. Usually, after we have done this for a number of years, we get to the point where we realize the only real value of these special remedies lies in the fact that you keep the patient under supervision a sufficient length of time to be of some help to him. The value of the physician in tuberculosis is the supervision he has over the patient. It is not a question of whether he gives tuberculin, it is not a question of whether he gives iodine, iron or what not, it is the ability to keep the patient under his thumb a sufficient length of time to effect a result. If he can do that, he has gone a long way toward treating the patient successfully.

I just want to say a little bit on the question of climate. When I first went to the Southwest, I thought, after I made my own recovery, that that was the only climate in which a consumptive could get well. There are a great many men, who from commercial reasons and from other reasons, still believe that. I do not want the blame to rest entirely on the physicians in the Southwest. I know just as many men in the East and Middle West who sit up on a pinnacle and claim that climate has absolutely no value in the treatment of tuberculosis. They are just as big fools as the men in the Southwest or in the West, who sit on a pinnacle and say, "Here is the only spot in the world in which tuberculosis can be cured." There are a number of those men in the East, and there are a number of those men in the West. But there are a certain percentage of honest individuals in both sections of the country that give climate the value it deserves.

I believe that climate can be summed up in one word, "luxury." If a patient has sufficient means to be able to travel to the Southwest or West and can get proper care and attention, his chances, as far as I can figure out from statistics, are about 15 per cent. better as to the ultimate outcome than they would be in the East. If that patient has not finances capable of carrying him for the full period of a year under proper conditions, then he is much better off in his home sanatorium.

I am brutally frank with my people. They come into my office and I examine them and I say, "How much money have you?" Sometimes it peeves them, but after explaining why I want to know how much money they have, they see the object. If a man says, "I have $100, $200, $300 or $400 with the expectation of getting well down there," I say, "Take that and buy a railroad ticket and go into your home sanatorium. Do not waste money in the Southwest." The Southwest is filled with cases of that particular type of people suffering with tuberculosis.

Climate is a luxury. If a patient can be watched back here in this country three or four months by a competent physician, at the end of that time a competent man is going to be able to judge as near as can be judged by prognosis, whether or not that individual is going to make a recovery. If he thinks his patient is not going to make a result at the

end of that time, he should not keep him for two or three years, but get him out to the Southwest before he is dead.

Captain Sylvester: I have been over the subject hastily, due to the late hour, and have left out a good many things which might well be said in regard to treatment.

I notice a correction in my copy which is illustrative of progressive therapy in tuberculosis. My typist had spelled psychic p-h-y-s-i-c, and at my demand for correction my paper shows "physic" to be rubbed out and "psychic" substituted.

We *are* erasing physic and replacing it with psychic.

In the hospitals with which I have been connected in the army, the boys claim they have received little treatment. We must not allow them to go home with the belief that our whole interest has been expended in diagnosis and in the findings of the laboratory and the morgue, but with the knowledge that there is a personal application of treatment. Treatment must be individual and affirmative.

THE CLASSIFICATION OF LARYNGEAL TUBERCULOSIS

By JULIUS DWORETZKY, M.D.
Liberty, N. Y.

I

In a paper read before the New York Academy of Medicine in 1914 the author proposed a classification of tuberculous laryngitis based on physical signs and symptoms. That classification was much similar to the classification of pulmonary tuberculosis previously employed by the National Tuberculosis Association, inasmuch as it depended chiefly on the extent of the lesion and on the manifested symptoms. After several years of study of the subject, however, the author has observed that patients with most extensive lesions of the larynx were not necessarily the ones that presented the worst prognosis and vice versa. Thus for instance he noticed cases of early involvement that became rapidly advanced, and where the patient died shortly; and on the other hand cases of very advanced involvement that always did well and presented a hopeful outlook. It was then observed that the prognosis as to life in patients with tuberculous laryngitis depended more on the type than on the extent of the lesion. Thus patients who presented acute edema with ulcerations in the larynx died shortly, those with a tendency to fibrosis lived considerably longer, while in patients where the tendency to fibrosis was extreme the prognosis with regard to life was hardly influenced.

The author then classified the cases into three types: 1, acute, 2, subacute, and 3, chronic, all depending on the character and course of the lesion.

As a result of the above observations the author became convinced that a classification based purely on physical signs or symptoms was incomplete, and only a classification that would combine both would be the most accurate and practical one for us to adopt.

II

AUTHOR'S PREVIOUS CLASSIFICATION OF LARYNGEAL TUBERCULOSIS

The following is the author's classification proposed before the New York Academy of Medicine in 1914:

Stage 1. Stage of infiltration, where part or parts of the larynx are affected. The symptoms are generally few or totally lacking.

Stage 2. Stage of edema with superficial erosions. Here symptoms referable to the larynx are usually present.

Stage 3. The larynx is extensively involved and the symptoms are often distressing.

III

THREE TYPES OF LARYNGEAL TUBERCULOSIS

The following is the description of the three types of laryngeal tuberculosis:

1. *The acute type* is characterized by a soft edema of the larynx with a marked tendency to ulceration. It may begin acutely or else follow the subacute or chronic type. It usually occurs in advanced pulmonary cases, often in moderately advanced, and occasionally in an incipient case. There is little or no tendency to fibrosis, and it, therefore, takes an acute course. Nodules consisting of tubercles can often be seen projecting above the surface of the mucosa. When the tubercles caseate they give rise to ulcers. During the stage of caseation the nodules often coalesce with the production of extensive ulcerations. The patient usually suffers from marked hoarseness or aphonia, sensation of fulness in the throat and irritation with constant desire to expectorate. Dysphagia is of common occurrence and may be very pronounced, depending largely on the location and the character of the ulcerations. With the patient in good general condition it may run its course, become subacute, and occasionally arrested, but in general the lesion is seldom amenable to treatment. As to the prognosis, the life of the patient is generally from six to eighteen months. It is often a terminal condition in patients with advanced pulmonary tuberculosis, and especially where the body is overwhelmed by the toxins of the tubercle, and has completely lost its acquired immunity to the disease. There is also a peracute type where the lesion progresses very rapidly and the patient dies in from a few weeks to three months from inanition and intensive toxemia. The above are probably the types which the older writers had in mind when they spoke of laryngeal tuberculosis as the "death warrant."

2. *The subacute type* is characterized by a pseudoedema of part or parts of the larynx with a moderate tendency to fibrosis. It may begin as such or else follow the acute or chronic type. It takes a subacute course and is usually benefited by treatment. Lesions with papilliform infiltrates and soft polypoid excrescences generally belong to this type. The local symptoms may be slight or moderate, depending largely on the extent and the site of the lesion. Hoarseness as a rule is present, particularly when the true vocal cords or the interarytenoid sulcus is involved. Dryness of the larynx is generally complained of, especially when the fibrosis is extensive. With the patient in good general condition it runs its course and may become arrested. The prognosis as to life depends much on the patient's general condition, and on an early diagnosis. With the proper treatment the prognosis in the average subacute case is favorable.

3. *The chronic type* offers the best outlook, and is characterized by firm infiltration of part or parts of the larynx with a marked tendency to fibrosis and healing. The lesion, due to an extensive proliferation of connective

tissue cells, is usually limited in extent to the affected areas, and may remain so for an indefinite period. These patients suffer very little, and often, with the exception of occasional dryness in the larynx and slight hoarseness, have no symptoms at all. For this reason this type is very often overlooked. The prognosis as to life is very good, and unless the lesion takes on the course of the acute or subacute type, this complication will have very little influence on the pulmonary condition. The diagnosis of this type, however, is of major importance. The patient should be told of the condition, so that the proper measures may be taken. Abuse of the larynx will often modify the course, while with proper attention this condition will usually remain secondary to the pulmonary lesion.

IV

PROPOSED CLASSIFICATION OF LARYNGEAL TUBERCULOSIS

The following is the proposed classification of laryngeal tuberculosis:

Peracute tuberculosis of the larynx

Acute tuberculosis of the larynx	Stage 1 Stage 2 Stage 3
Subacute tuberculosis of the larynx	Stage 1 Stage 2 Stage 3
Chronic tuberculosis of the larynx	Stage 1 Stage 2 Stage 3

Dr. Sari of Paris makes the following able suggestion: "Inasmuch as the type of the lesion is determined chiefly by its course, to insure greater accuracy, the diagnosis as to the type of the lesion should be made only after several observations." This suggestion meets entirely with the author's approval and will undoubtedly save us from a number of errors. To illustrate: A case of tuberculosis of the larynx may be classified on the first examination as stage 1, 2 or 3. If the type of the lesion at that time cannot be definitely determined, the patient should be observed for a period of several weeks and even several months. The course of the lesion will then enable us to determine its type, and we can then classify it accordingly, that is, acute, subacute or chronic.

V

HOW LARYNGEAL TUBERCULOSIS SHOULD AFFECT THE CLASSIFICATION OF PULMONARY TUBERCULOSIS

From several years of observation and study of the subject it is the author's opinion that laryngeal tuberculosis should affect the classification of pulmonary tuberculosis in the following manner:

1. Cases of pulmonary tuberculosis with acute or peracute involvement of the larynx, no matter in what stage the pulmonary lesion may be, should be classified as advanced.

2. Cases with subacute tuberculosis of the larynx should be advanced one stage. That is, those with incipient pulmonary tuberculosis should be classified as moderately advanced, and the moderately advanced as advanced.

3. Cases with chronic tuberculosis of the larynx should be classified strictly according to the pulmonary condition, for such laryngeal lesions usually have no effect on the prognosis of the disease.

DISCUSSION ON PAPER BY DR. DWORETZKY

Dr. M. J. Fine, Newark, N. J.: I would like to cite a laryngeal tuberculosis case that I have seen in the City of Newark and would like to follow it up with a question. I do not know whether I have the right to say it was a primary laryngeal tuberculosis case, after hearing Dr. Bushnell's paper. The case was a very acute one. The man was entirely well a short time before he presented himself for the examination and symptoms were not present. When he came to our clinic we found an ulceration of the epiglottis and swollen arytenoids. The chest was examined and found to be absolutely negative. A radiograph was taken and proved to be negative. The man lived two weeks, during which time his chest was repeatedly examined and no pulmonary lesion was found. I would like to ask Dr. Dworetzky whether he has ever seen a primary laryngeal tuberculosis case.

The Chairman: Did you get a post-mortem on the case?

Dr. Fine: No. From the physical and radiograph findings it was impossible to find a lesion in the chest, as I said, but the examination of the throat showed a laryngeal tuberculosis. A positive sputum was found every day until the man's death.

Dr. S. A. Knopf, New York: Had he edema?

Dr. Fine: Yes.

Dr. Knopf: Was there a marked dyspnea?

Dr. Fine: Before death.

Dr. Knopf: You did not perform tracheotomy?

Dr. Fine: No.

Dr. Knopf: I would have performed tracheotomy.

Dr. Dworetzky: Primary cases have been reported, but they are very rare. Personally, I never saw a primary case of laryngeal tuberculosis. All cases which I have seen were secondary to pulmonary tuberculosis, but I know that a few cases of primary laryngeal tuberculosis have been reported.

LUNG ABSCESS FOLLOWING OPERATION ON THE UPPER RESPIRATORY TRACT*

By FREDERICK SLYFIELD, M.D.
SEATTLE

THIS matter will be considered in two divisions.

I. THE RELATIVELY FREQUENT APPEARANCE OF CASES OF PULMONARY ABSCESS CLEARLY THE RESULT OF OPERATIONS UPON THE NOSE, TEETH AND TONSILS

Granted that most abscesses of the lung are due to the pneumonias, vegetative endocarditis, suppurative processes in divers parts of the body, emboli and various undetermined causes, there remains a considerable group which may readily be traced to surgical manipulation of infected areas above the larynx. A single spectacular case will convert the sceptic. And, when one sees in his own practice 30 cases of lung abscess, of which nine follow closely upon the heels of such operations, he cannot avoid definitely associating the effect with the apparent cause.

Two paths of infection at once come to mind by which such accident may take place. The plexus tonsillaris may pick up infective material from the wounded tonsillar region and convey it with the venous blood through the internal jugular and superior vena cava to the right heart, passing through vessels ever increasing in size. The right ventricle then inevitably forces it into the aerating tissues of the lung, through ever diminishing vessels which naturally tend to retard the embolus or toxic matter and deposit it in the lung. But this same logic should and does apply to suppuration in any part of the body; yet abscess occurs far more commonly from apparently trivial diseases of the nose and throat than from infections elsewhere. Aspiration, however, is a very simple and natural method of lung infection and this probability is supported by the statistical fact that nearly all of these abscesses occur in patients subjected to general anesthesia.

If a local anesthetic is used and the laryngologist is skillful, complications seldom follow. If the patient is etherized and the operator is careless or too rapid there is grave danger of pulmonary invasion by pus, blood, caseous or milky exudate or particles of tissue from the diseased tonsil. Our knowledge of bronchial tree anatomy and our experience with foreign body localization in the lung would lead us to expect aspiration abscesses to occur in the right lower lobe, and this is precisely what we do find in many of them. No explanation has been offered, so far as I know, for a large percentage of aspiration abscesses occurring in the middle lobe or the upper lobes. I suggest the following: Pneumonia

*Read by title.

generally attacks the lower lobes, hence pneumonia abscesses are naturally found in the base, but in considering aspiration it is necessary to recall that most of these patients have been subjected to a general anesthetic and consequently, to the recumbent position, and therefore gravity would assist in settling the aspirated infective material at a higher level.

Many lung abscesses cure spontaneously, as in the following case:

Case 1. S. D. Male, age 16. Five decayed teeth removed under general anesthesia. Three days later developed pain in region of right lower lobe, cough and temperature of 102. White count 22,000. Ten days after teeth extraction, roentgenogram showed classic picture of pulmonary abscess. A perfectly spherical cloud hung in the lower part of the otherwise normal right lung. Patient was kept in bed and on the twelfth day was relieved by a gush of purulent sputum. Temperature receded to 99.4 in the afternoon and he felt well. On the fifteenth day, all symptoms were reëstablished and I desired to collapse the lung. Parents objected. On the twenty-fifth day another burst of sputum cleared the symptoms and patient made an uneventful recovery. Doubtless many such cases have occurred without a diagnosis.

But too many lung abscesses pass into a deplorable, chronic state, which is scarcely amenable to treatment, owing to metastatic spread. At autopsy I have seen abscess spreading throughout the whole of one lung, forming a discolored, fetid mass of connective tissue, traversed by eroded blood vessels and honeycombed by confluent cavities filled with unrecognizable débris and bearing no semblance to lung tissue at all. I have seen a chronic parenchymatous suppuration, involving an entire lung, revealing a perfect blank to the x-ray. Four of my cases have shown this condition. These cases are inoperable because of the great danger of empyema and because, barring empyema, a simple incision or rib resection cannot drain an entire lung. In two of these startling cases artificial pneumothorax produced almost unbelievable results, with rapid and apparently complete recovery. In the other two pleuritic adhesions prevented collapse and they passed through months of invalidism in the sanatorium with ultimate recovery.

Manges'[1] "Occurrence of Abscess of the Lung after Tonsillectomy with Report of Nine Cases," a most excellent article, illustrates the frequency of this accident, and implies that it often happens in cases operated on by skillful men. We have learned in recent years that every tonsil represents a potent harbor of infection. Now we are beginning to realize that its removal is dangerous. Naturally a sense of uncertainty arises. Richardson[2] pleads for recognition of this common sequel to upper air tract surgery and reports several recoveries without definite treatment. He concludes with the question, "When one considers the serious character of this form of complication, are we justified in considering it in so light a manner as we have in the past? Should we not weigh more carefully the evidence brought forward against the tonsil as the possible source of remote infection, eliminating most thoroughly all the other possible sources of infection, before the tonsils are consigned to the surgeon for removal?" Bevan[3] calls attention to a dozen lung and brain

abscesses following tonsillectomy and manifests astonishment at the statement of a number of throat specialists that such accident has never occurred in their practices. He also illustrates a method of draining abscess with the aid of the cautery. Dean Lewis[4] reports a case following tonsillectomy, in which he resected two inches of the fourth rib, and exposed the consolidated area in the lung. There were no adhesions and the *lung collapsed*. He packed a roll of iodoform gauze tightly over the abscess without opening it. Patient made an uneventful recovery.

II. Artificial Pneumothorax in the Treatment of Lung Abscess

Since many simple lung abscesses discharge bronchially and cure spontaneously, every case should be given two weeks to attempt recovery without treatment other than rest, fresh air and good food. If there is no very definite evidence of improvement by this time, the lung should be collapsed by inflating the pleural space with filtered sterilized air. In reading the literature noted in the bibliography to this paper I am impressed with the great delay in recovery of the spontaneous cures. And in many cases operated upon it is evident little was done which might not have been accomplished far more easily and comfortably and with less danger by induced pneumothorax.

As an illustration note the case, summarized above, reported by Dean Lewis. Rib resection was done and the lung collapsed as air was admitted. It seems to me probable that the collapse had far more to do with his admirable result than had the roll of iodoform gauze, and if so the same might have been done with a needle.

At the Pulmonary Hospital we have settled down to lung collapse as a valuable routine expedient in treating lung abscesses and have no regrets, though occasionally a case goes to the surgeon later. We have lost only one case by this method.

Case 2. This was a woman of foreign birth, in whom it was quite impossible to cultivate cough control. She was determined to cough violently and persistently day and night and died in spontaneous pneumothorax with cardiac displacement and circulatory embarrassment. I had inflated the left pleural cavity three times.

Case 3. Male, age 16. Past history negative. September 1, 1918, had tonsillectomy under ether. Six days later developed fever, chills, pain in the right chest, cough and expectoration. Frequent bursts of purulent sputum were followed by relief of symptoms for two or three days. I saw him September 25; temperature 102; pulse 130. Sputum showed pus cells, staphylococci, streptococci, pneumococci and elastic tissue. No tubercle bacilli. Physical examination. Dullness with increase of tactile fremitus over entire base of right lung. Bubbling rales posteriorly. Blood: Hb. 80 per cent., reds 4,080,000, whites 23,000. Roentgenogram showed right lower lobe shaded.

On October 2 I inflated the right pleural space with 800 cc. of filtered sterilized air. During the next 48 hours he expectorated enormous quantities of foul pus. On October 6, temperature was normal and

patient felt well. White count, 10,000. In three weeks he returned to work and has had no trouble since. In May, 1919, he joined the United States Navy.

Case 4. M. I. Male, age 38. Had broncho-pneumonia in spring of 1917. Never recovered. Came to me July, 1918. Left lower lobe solid. Temperature frequently to 103. Collapse was impossible because of pleuritic adhesion and consolidation. Breath and sputum horribly offensive. Autopsy, September, 1918, showed complete fibrosis of lower lobe with gangrenous center.

Case 5. M. F. Past history negative. Tonsillectomy January, 1918, under ether. Became ill immediately. High fever, incessant cough, purulent sputum in spasmodic spurts. Diagnosed empyema but thoracentesis revealed nothing in the pleural space.

I saw him April 21. Blood: Hb. 75 per cent., reds 3,300,000, whites 18,000. Sputum: Pus, elastic tissue fibres, staphylococci, pneumococci but no tubercle bacilli. Physical findings: Entire right chest dull to percussion. Breath sounds absent. Roentgenogram shows entire right chest in shadow. Patient emaciated from three months' severe illness. Autogenous vaccine and artificial pneumothorax were administered. Patient began to improve and, while recovery was not spectacular, he was able after three inflations to resume his work in July, 1918.

Roentgenogram in September was very interesting. It showed a tiny, clear-cut shadow about one by three centimeters in the right lower lobe and slightly diminished size of the whole lung. Otherwise it is perfectly clear. Fluroscopic examination reveals phrenocostal angle partly obliterated and retarded motion of right diaphragm. Patient gained 25 pounds and is in excellent health.

Case 6. C. C. Male, age 40. Tonsillectomy June, 1917, under ether. The following week he developed a lung abscess in the lower part of the right upper lobe. Critically ill through June, July and August.

On August 30 I saw him. Temperature 101 to 102 daily. Entire right lung filled with pus. Sputum contain pus, elastic fibers, staphylococci, B. influenzae and pneumococci. No tubercle bacilli. Hb. 70 per cent., reds 3,800,000, whites 36,000.

On September 2 I collapsed the right lung with 1500 cc. filtered sterilized air. In two weeks his temperature was normal for a day, then rose again and on September 17 I refilled with 1300 cc. Temperature receded promptly and has been normal ever since. A third inflation was done in two weeks. Patient had become emaciated from his normal 163 pounds to 132, so remained at the sanatorium to recuperate. In four months he weighed 173 and went to work. He has had no recurrence to date.

Case 7. R. B. Male, age 18. Past history unimportant. Had submucous resection April 1, 1918. Soon afterward developed cough, pain in the chest, expectoration, fever and malaise. Diagnosed pneumonia, pleuritic effusion, empyema, grippe, tuberculosis, etc., by different physicians. Treated in various ways for four months.

Came under my observation in August. Patient very much emaciated

and colorless. Very ill. Temperature 103, pulse 145. No sputum at that time, but nurse said he had raised a gallon (?) the previous week. Physical findings: Entire right chest dull to percussion, breath sounds markedly diminished, distant coarse rales. Blood: Hb. 80 per cent., reds 3,800,000, whites 11,500. Ten days later he raised an enormous quantity of purulent sputum, containing staphylococci, pneumococci and elastic tissue. No tubercle bacilli. Roentgenogram showed entire right chest in shadow, and heart displaced so that apex apparently almost touched the left thoracic wall. Collapse was impossible because of pleuritic adhesions. Autogenous vaccine, rest, fresh air and good feeding have kept him alive through months of struggle and now the upper two-thirds of the right lung is clear. Recently I located the original abscess and put in a tube. I feel that artificial pneumothorax if attempted three months earlier would have saved him a wasted year.

Forlanini[5] apparently cured an abscess of six years' standing by collapsing the lung. Simon and Sweezey[6] cleared up an acute case by this means.

We have been collapsing our lung abscesses and also our tuberculosis cases behind the fluroscopic screen and find it a very useful procedure. Most patients can stand this inconvenience for a few minutes. The patient is first seated in a straight chair behind the iridescent screen and fluroscoped. Then the needle is inserted, the air admitted and the lung seen to collapse. The location of the needle may easily be changed if the collapse is not satisfactory. The entire proceeding may readily be watched simultaneously with the introduction of the filtered, sterilized air.

Since writing this paper I have read of the work of Goldberg and Biesenthal[7] and note that they too have found artificial pneumothorax very promising in treating lung abscess.

SUMMARY

Lung abscess follows nose and throat operation sufficiently often to merit serious consideration.

Tonsil surgery should be done only when the assurance of benefit justifies the danger.

General anesthesia is to be deplored in tonsillectomy as the incidence of lung abscess is far greater with general than with local anesthesia.

Artificial pneumothorax should be used in all cases before resorting to radical measures as it has given many excellent results.

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PATHOLOGICAL SECTION

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ETIOLOGICAL STUDIES IN TUBERCULOSIS

By

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THE etiology of pulmonary tuberculosis is far from being a closed subject, and this communication is an attempt to supply what seems to some workers missing links in the etiologic chain. The dicta of many authorities have been apparently blindly accepted by their followers. On close scrutiny it is seen that many statements rest upon inference rather than upon fact. We have attempted in these few experiments upon guinea pigs to accept no statements, and to trace the tubercle bacillus if possible directly from the source of infection to the apparently exposed animal. The final test was of course the autopsy of the guinea pig. In succession we studied the dust of rooms, the telephone receivers, the eating utensils, the infected hands of patients, the saliva, the transmission by kissing, the infection of tooth brushes, and the danger of flies and of coughing in tuberculous infection for guinea pigs.

I. THE DUST OF ROOMS

Since Hance found tubercule bacilli in the dust of a room on whose floor a patient had spat, and failed to find them in other rooms, several attempts have been made to discover tubercle bacilli in the dust at the Trudeau Sanatorium. The dust collected by a vacuum cleaner from a large rug in the living room was negative on injection into a guinea pig. The same result was obtained with the dust from a room in the infirmary occupied by a patient with numerous tubercle bacilli in the sputum and a cough so explosive that the mouth was rarely covered. Notwithstanding these results we again investigated the subject and chose only rooms occupied by patients with severe cough and many tubercle bacilli in the sputum. Dust was collected before the daily cleaning by swabbing with sterile swabs the bed tables, chairs, bed frames, corners of the rooms and walls near the patient. The swabs were washed in sterile broth, the washings treated with normal sodium hydroxide, incubated for one-half hour, then neutralized with normal hydrochloric acid, centrifugalized and the sediment divided into three portions. One was inoculated into gentian violet media, another stained on a slide for microscopic examination, and the third inoculated subcutaneously in the inguinal region into guinea pigs, two for each swab. In all 24 animals were used.

Results. As the gentian violet media was all contaminated, chiefly by moulds, this method of study was abandoned.

As the slides stained for tubercle bacilli were all negative and not satisfactory, it was decided to pursue the study only by the inoculation of guinea pigs.

The 24 guinea pigs inoculated February 9, 1916, were killed 41 days later and all organs, except a few enlarged bronchial glands and spleens, appeared normal macroscopically. The suspected organs were macerated and inoculated into a second series of guinea pigs, March 22, 1916, which were killed April 27, 1916, and were all negative for tuberculosis.

We then investigated the dust of two rooms in Saranac Lake Village, occupied by two patients both long since dead, one a young colored girl, the other an advanced case. Both had numerous tubercle bacilli and violent coughs. The results were also negative. Since that time the sister of the colored girl who nursed her has developed pulmonary tuberculosis.

The mouthpiece of the telephone used in common by the patients at Trudeau was carefully swabbed out. The results of inoculation were also negative.

Thinking that infection by inhalation might prove more efficacious, we constructed a special glass box in which the guinea pigs were placed and kept in a definite position. This box was then attached to a vacuum cleaning apparatus and dust drawn through it for one-half hour. The three guinea pigs used were not infected. (Subjected to dust August 7, 1916; intracutaneous test September 20, $\frac{1}{2}$ cc. of 1 per cent. old tuberculin, negative; autopsied September 24, and suspected organs macerated and inoculated into a second series of guniea pigs, which at autopsy, November 20, 1916, showed no tuberculosis.)

II. EATING UTENSILS

The plates, cups, glasses (water and milk), forks, spoons and knives of patients who had numerous tubercle bacilli in their sputum (Gaffky VII and IV) were studied immediately after breakfast. Particular attention was paid to those parts of the cups and glasses that come in contact with the lips. For study plates and knives, cups and glasses, and spoons and forks were grouped together. Swabs were used and treated as in the first study. With the exception of two glasses (noted above) and two spoons, one each of the utensils mentioned was studied for each patient.

Results. The spoons, forks, glasses and cups were contaminated with tubercle bacilli, while the knives and plates remained free. In each autopsy a small portion of the spleen and the pus from the glands were used for smears and acid fast organisms demonstrated. (See Table I.)

As Price[1] had previously proved, ordinary washing and rinsing in very hot water is sufficient to sterilize these utensils.

III. CONTAMINATED HANDS

Two patients with abundant sputum loaded with tubercle bacilli were instructed to cough hard and frequently upon their hands, which were

TABLE I

Name	No.	Utensils	Microscopic Examination for Acid Fast Bacilli	Result of Animal Inoculation Inoculated April 26, 1916 Killed June 6, 1916
Patient No. 1 Miss E.	W 1	Plates and knives	Negative	a. No tuberculosis
				b. No tuberculosis
	W 2	Cups and glasses	Positive	a. Moderate tuberculosis
				b. Generalized tuberculosis
	W 3	Spoons and forks	Positive	a. Died May 1, 1916, unknown cause.
				b. Generalized tuberculosis
Patient No. 2 Mr. M.	W 4	Plates and knives	Negative	a. No tuberculosis
				b. No tuberculosis
	W 5	Cups and glasses	Positive	a. Questionable tuberculosis
				b. No tuberculosis
	W 6	Spoons and forks	Negative	a. No tuberculosis
				b. No tuberculosis

then washed in a small quantity of sterile water. The entire wash water was then (September 1, 1916) injected into guinea pigs, two for each patient. At autopsy (October 20, 1916) generalized tuberculosis was found in all four guinea pigs. This confirmed the work of Baldwin.[2]

An attempt was then made to infect the hands of a second person by hand shaking and a doorknob by rubbing it with the infected hand. After coughing upon the hand, the patient immediately shook hands with a person whose hands had been previously cleansed. The hands of the second person were washed as previously described and the entire wash water injected subcutaneously in the inguinal region into four guinea pigs (September 1, 1916), all of which remained free from tuberculosis (autopsied October 20, 1916).

On January 26, 1919, this experiment was repeated and two guinea pigs injected, in which at autopsy (February 24, 1919, and March 6, 1919) no tuberculosis was found. The patient employed to cough had been so impressed with the danger of coughing that his attempts were considered too feeble, and again, on March 14, 1919, the experiment was repeated and the two guinea pigs killed June 3, 1919, and found to contain no tuberculosis. In all these experiments cultures of the wash water on gentian violet media and slides stained with carbol-fuchsin were negative. (See Table II.)

A patient with positive sputum was made to cough several times into his hand and rub his hand over a doorknob previously sterilized. The

doorknob was washed with sterile normal salt solution, and this injected subcutaneously in the inguinal region into two guinea pigs, January 26, 1916. At autopsy, June 3, 1919, the guinea pigs showed no tuberculosis, and the slides stained by carbol-fuchsin and the gentian violet media inoculated were all negative. (See Table III.)

TABLE II

No	Date of Inoculation	Date of Death	Degree of Tuberculosis	Acid Fast Bacilli	Autopsy
Hs 1	26–1–19	24–3–19	0	0	Negative to tuberculosis
Hs 2	26–1–19	3–6–19	0	0	Negative to tuberculosis
Hs 3	14–3–19	3–6–19	0	0	Negative to tuberculosis
Hs 4	14–3–19	3–6–19	0	0	Negative to tuberculosis

TABLE III

No	Date of Inoculation	Date of Death	Degree of Tuberculosis	Acid Fast Bacilli	Autopsy
Dk 1	12–1–19	3–6–19	0	0	Negative to tuberculosis
Dk 2	12–1–19	3–6–19	0	0	Negative to tuberculosis

IV. THE SALIVA

Before studying the danger of transmission of tubercle bacilli through kissing, it was deemed advisable to study the saliva. The saliva of two patients with numerous tubercle bacilli in the sputum was collected in a sterile container just before coughing and inoculated subcutaneously in the inguinal region into two guinea pigs (September 1, 1916). At autopsy, October 20, 1916, both showed extensive tuberculosis.

V. KISSING

The lips are constantly moist with saliva and frequently contaminated with sputum. To prove transmission of tubercle bacilli to the object kissed a patient with many tubercle bacilli in the sputum (Gaffky VIII) was instructed to kiss a sterile petrie dish which was washed with sterile normal salt solution, and inoculated as previously described into guinea pigs. The guinea pigs inoculated with the washings from plates kissed immediately after, and ten minutes after coughing developed generalized tuberculosis, while those inoculated twenty minutes after coughing remained free from tuberculosis. (See Table IV for details.)

As infectiousness of the dishes seemed to vary somewhat with the time of coughing, it was deemed advisable to investigate the question of time more closely. A patient with numerous tubercle bacilli in the sputum was requested to kiss sterile petrie dishes at 7.00, 9.00 and 11.00 a. m., 2.00, 4.00, 6.00 and 9.30 p. m. and to return the dish to the laboratory immediately after kissing it. The dishes kissed at 11.00 a. m., 4.00, 6.00 and 9.30 p. m. were negative, the remainder were positive. The experiment was repeated with a patient with fewer tubercle bacilli (Gaffky IV to VII) and only at 7.00 a. m. was the dish found to be positive. (See Table IV for details.)

TABLE IV

Name	No.	Time of Kissing	Result of Animal Inoculation Inoculated Oct. 12, 1916 Killed Dec. 12, 1916
Patient No. 1 W	K 4	7 a. m.	Tuberculosis
	K 5	9 a. m.	Tuberculosis
	K 6	11 a. m.	No tuberculosis
	K 7	2 p. m.	Tuberculosis
	K 8	4 p. m.	No tuberculosis
	K 9	6 p. m.	No tuberculosis
	K–10	9.30 p. m.	No tuberculosis
Patient No. 2 B	K 11	7 a. m.	Tuberculosis
	K 12	9 a. m.	No tuberculosis
	K 13	2 p. m.	No tuberculosis
	K 14	4 p. m.	No tuberculosis
	K 15	6 p. m.	No tuberculosis

VI. THE TOOTH BRUSH

The tooth brush of a patient with tubercle bacilli in the sputum was washed immediately after it had been used by the patient, in two cc. of sterile normal salt solution, which was injected, January 26, 1919, subcutaneously in the inguinal region into two guinea pigs. One guinea pig died in three days, and the other, autopsied June 3, 1919, showed marked tuberculosis. While slides stained with carbol-fuchsin were only questionably positive, gentian violet media showed growth in the 21st day.

On March 28, 1919, the experiment was repeated and was positive by stain, by culture and by inoculation. (See Table V for Details.)

TABLE V

No	Date of Inoculation	Date of Death	Degree of Tuberculosis	Acid Fast Bacilli	Autopsy
B 1	26–1–19	3–6–19	xxx	x	Many tubercles in the lungs and few in the liver. Spleen enlarged and nodular. Bronchial and inguinal glands markedly enlarged
B 2	26–1–19	29–1–19	0	0	Negative to tuberculosis
B 3	28–3–19	3–6–19	xxx	x	Many tubercles in the lungs and few in the liver. Spleen enlarged and nodular. Bronchial and inguinal glands markedly enlarged
B 4	28–3–19	31–1–19	0	0	Negative to tuberculosis

On this date (March 28, 1919) the washings made twelve hours after the brush had been used were studied. One guinea pig died the day after inoculation, but the second showed marked tuberculosis, at autopsy (June 3, 1919). Slides stained and gentian violet media inoculated were both negative. (See Table VI for details.)

TABLE VI

No	Date of Inoculation	Date of Death	Degree of Tuberculosis	Acid Fast Bacilli	Autopsy
B 5	28–3–19	29–3–19	0	0	Negative to tuberculosis
B 6	28–3–19	3–6–19	xxx	x	Many tubercules in the lungs and few in the liver. Spleen enlarged and nodular. Bronchial and inguinal glands enlarged

VII. FLIES

Many have definitely proved that flies fed upon tuberculous sputum are contaminated with tubercule bacilli and deposit specks that contain tubercle bacilli. To verify this we placed three flies in a large sterile beaker and fed them on sputum containing many tubercle bacilli. The flies apparently developed diarrhoea and deposited soft white specks, forming large circles, which contained on examination tubercle bacilli. A study of the bodies and wings of the flies, by inoculation into guinea pigs, showed that they were generally contaminated with tubercle bacilli, for all the guinea pigs developed generalized tuberculosis.

Next a study was made of the real practical danger to young guinea pigs (two-thirds grown) by such flies when they crawled over and contaminated their food.

Five guinea pigs were placed in a wire covered cage or box, and 20 to 30 or more flies confined with them. As the flies died off they were replaced by others. A receptacle containing sputum with numerous tubercle bacilli in it was placed high in the cage. The flies fed on the sputum and on the carrots which they specked. The specks were shown to contain tubercle bacilli by inoculation of guinea pigs, and the guinea pigs in the cage ate the specks in the carrots. All the guinea pigs in the cage failed to react to old tuberculin given subcutaneously and atautopsy showed no trace of tuberculosis. (See Table VII for details.)

TABLE VII

No.	Source of Contagion Manner	Date of Inoculation or Exposure	Date of Death or Autopsy	Autopsy
Fg 1 a	Fly specks	Nov. 3, 1916	Dec. 22, 1916	Generalized tuberculosis
Fg 1 b	Subg. inject.	"	"	"
Fg 2 a	Pulverized feet of flies inoculated	"	"	"
Fg 2 b	"	"	"	"
Fg 3 a	Pulverized bodies of flies inoculated	"	"	"
Fg 3 b	"	"	"	"
Fg 4 a	Pulverized wings of flies inoculated	"	"	"
Fg 4 b	"	"	"	"
Fg 5	Carrots infected by flies	Nov. 3 to Dec. 22, 1916	Dec. 22, 1916	Normal ($\frac{1}{2}$ cc. O. T. and no reaction Dec. 20)
Fg 6	"	"	"	"
Fg 7	"	"	"	"
Fg 8	"	"	"	"
Fg 9	"	"	"	"
Fg 10 a	Fly specks from carrots in cage	Nov. 10, 1916	Jan. 3, 1917	Moderate tuberculosis
Fg 10 b	"	"	"	"

This experiment was repeated on November 18, and two sets of guinea pigs (four each) used. The first set was exposed to food contaminated by flies with tubercle bacilli from sputum (Gaffky IV to IX) and the second set to bovine tubercle bacilli which had been mixed with negative sputum. The flies were changed weekly. The results were all negative. (See Table VIII for details.)

TABLE VIII

Date of Experiment, November 18, 1918

No.	Type of Tuberculosis	Date of Death	Acid Fast Bacilli	Autopsy
Fly 1	Bovine	June 2	0	Negative to tuberculosis
Fly 2	Bovine	"	0	Negative to tuberculosis
Fly 3	Bovine	May 24	0	Negative to tuberculosis with exception of few nodules in the spleen
Fly 4	Bovine	June 2	0	Negative to tuberculosis
Fly 5	Human	"	0	Negative to tuberculosis
Fly 6	Human	"	0	Negative to tuberculosis
Fly 7	Human	"	0	Negative to tuberculosis
Fly 8	Human	"	0	Negative to tuberculosis

VIII. COUGH

Only one experiment was done with cough. Two patients with numerous tubercle bacilli in the sputum were instructed to cough into the faces of guinea pigs when performing their pulmonary toilet in the morning. This was done on November 12, 1916, but the two guinea pigs showed at autopsy no tuberculosis.

DISCUSSION AND SUMMARY

No originality is claimed for many of these experiments. The whole study was an attempt to discover whether infection in guinea pigs at least followed exposure to what many have by inference referred as sufficient exposure for infection of man. We do not wish to imply that these few experiments should be looked upon as proof positive in a matter so important as this, but contend that they emphasize the caution that must be used when infection is inferred to follow proof of contamination. The danger of the dust of rooms in a health resort, from telephone receivers, the danger of eating utensils properly cleansed, the danger from infected hands through handshaking or from knobs of doors, the danger of transmission by infected flies, at least in guinea pigs, has not yet been conclusively proved, and these experiments tend to belittle it. On the other hand the danger of transmission of tubercle bacilli by kissing, or the transference of the tubercle bacilli to eating utensils, and thence if not cleansed to a second person, has been borne out. Our hope in publishing these experiments is that others may realize that the etiology of tuberculosis is not a closed book but one that contains many disconcerting and confused pages that need to be rewritten.

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THE ORIGIN AND RELATIONSHIPS OF THE BRONCHIAL ARTERY IN THE GUINEA PIG*

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About a year ago C. J. White made the interesting observation in the anatomical laboratory of the University of Wisconsin of an unusual origin of the bronchial artery in the guinea pig. The condition was at first thought to be simply a variation from the normal, but a second animal was found to possess a similar "anomaly," and subsequent work showed that the normal vascular anatomy of the guinea pig, particularly as regards the bronchial artery and the anterior intercostals, is characteristic and different from that in other mammals so far described.

Following this lead, a more detailed study of the anatomy of the bronchial artery in this animal has been made, the full results of which work will be presented in one of the anatomical publications. For the present purpose, however, it suffices to consider mainly some of the finer intrapulmonary relationships of the vessel in question. Knowledge of the minute relations of the two arterial systems to each other, to the lymphatics, to the lymphoid tissue, to the lung parenchyma and to the pleura is essential to the understanding of the nature of the disease processes found in the organ. So much is knowledge of structure essential to a clear understanding and appreciation of pathological changes that one might almost regard microscopic structure as the "attendant circumstance of infection." For this approach to the subject it is my purpose to consider the bronchial artery in its relation to: (1) the pulmonary artery, (2) the vasa vasorum, and (3) the lymphoid tissue and lymphatics of the lung.

Before entering into a consideration of these three aspects of the subject, it is well to state that the difference between the vascular anatomy of the guinea pig and other mammals lies in the fact that the bronchial artery in this animal arises neither from the dorsal aorta, as is generally supposed, nor from the intercostals as is the case in many mammals, but rather from a vessel which has its origin in the right subclavian artery and which is distributed to the first six or seven intercostal spaces. Figure 1 illustrates this vessel and the bronchial artery arising therefrom. The bronchial artery passes to the trachea and along this structure to the hilum of the lung supplying in its course the lympho-

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glandulae along the trachea and at the hilum. Branches of the vessel course along the bronchi for a short distance and then penetrate the fibrous wall.

I. THE RELATION OF THE BRONCHIAL AND PULMONARY ARTERIES

The branches of the bronchial artery—usually three or four in number—lie deeply imbedded in the bronchial wall and run more or less parallel to its long axis, the trunks connecting freely with one another through smaller branches. The question of anastomosis between the bronchial and pulmonary arteries was a mooted one from the time of Ruysch* who, in 1731, first described the bronchial, until 1839, at which time Guillot* established the fact that the two systems are independent.

The relation between the two blood systems in the lung is quite analogous to that which Mall[1] has so clearly shown to exist in the liver between the hepatic and portal systems. On the basis of differential injections, Miller[2] has proved the independence of the pulmonary and bronchial systems. By using injection material that flowed freely through capillaries, he found the bronchial arteries partially filled from an injection into the pulmonary artery—the pulmonary vein being tied off. Under the same conditions, but with the use of an injection mass carrying granules too coarse for passage through the capillaries, there was no bronchial injection. The conclusion he draws is that *the only communication between the two systems is a capillary communication.*

This work by Miller and similar work by others were done on the lungs of man and the dog. Apparently no one has investigated the guinea pig with the view of determining this point. From the results of the work here reported, it is quite clear that there are definite—though only occasional—anastomoses between the two systems in the guinea pig. The anastomosing vessel arises from a branch of the pulmonary artery very close to the main trunk, always within the zone of areolar tissue about the artery and bronchus. It usually makes a sharp turn, describing a small arc in so doing, and immediately penetrates the bronchial wall where it joins the bronchial artery.

For a given vessel, there is never more than the one anastomosis. One usually encounters the connecting point at a level corresponding approximately to the middle of the lobe. Figure 2 shows the relation between these two systems. It should be noted in the figure, which is a combination drawing of sections aggregating 200 microns in thickness, that the anastomosing branch arises from a branch of the pulmonary artery, that in its early course the artery describes an arc, and that it enters the bronchial wall immediately without giving rise to any capillaries.

For a more graphic representation of the condition one may refer to figure 3. This figure is a photograph of a reconstruction model in plaster that was based on serial section drawings. Here the bronchial artery

* Quoted from Miller.

continues beyond the point of anastomosis, passes toward the periphery of the lung and ultimately loses itself in the capillary network. A point of interest is the relatively large size of the bronchial trunk which has a diameter nearly equal to that of the contracted bronchus in the wall of which it courses.

The significance of this relationship is not altogether clear. It is probably a safety provision whereby the bronchus may be nourished in the event of a closure of the bronchial artery, or by which the bronchial artery could assume and maintain the function of the pulmonary should there be an obstruction of a branch of the latter vessel. In either event, granting that the anastomosis exists in man, such a condition might present itself in the case of a mediastinal tumor from enlargement of the lymph nodes at the hilum, from an aneurysm, a dilated heart, or from other similar conditions. That there is a connection between the two systems capable of development into a state of serviceable function has been shown by experiment. Ghoreyeb and Karsner[3] working with the dog, were unable to inject the bronchial system through the pulmonary artery or vice versa so long as they maintained a pressure as high as 10 mm. of mercury in the system not being injected at the time. If they injected into either system at a time when a pressure of less than 10 mm. of mercury obtained in the other system, both systems became injected; and they concluded that "as long as a definite pressure is maintained in either the pulmonary or bronchial circulation, the admixture of bloods is extremely limited. If, however, in either system the pressure sinks to zero, the possibility of supply by the other system becomes evident. . . . It is therefore probable that either circulation can suffice for the simple nutritive demands of the lung if the other system is interfered with." This fact lends plausibility to the hypothesis that a significant exchange of blood between the bronchial and pulmonary systems might readily take place in the event of altered pressure relations.

II. RELATION OF THE BRONCHIAL ARTERY TO THE VASA VASORUM

The pulmonary artery lies everywhere in close apposition to the bronchus, and the wall of this vessel possesses a rich blood supply. The vasa vasorum of the pulmonary artery originate from the bronchial artery and should be regarded as an extension of and an integral part of the bronchial arterial system. Of this, there can be no doubt. Figure 4 well illustrates the relationship just mentioned. Here one can see a branch of the bronchial artery at a point where it divides, one branch passing to a mass of lymphoid tissue and another to the adventitia of the pulmonary artery where it forms the vasa vasorum.

III. RELATION OF THE BRONCHIAL ARTERY TO THE LYMPHOID TISSUE AND LYMPHATICS

Many workers in histology have described lymphoid tissue in the lung, usually close to bronchi and blood vessels. Burdon-Sanderson[4]

called attention to the fact that he uniformly found masses of lymphoid tissue in close relation to the bronchi and pulmonary arteries; and Miller[5] goes so far as to say that lymphoid tissue which, in single sections, is apparently indigenous to the lung parenchyma and not situated near bronchi, will, if one studies the tissue in serial sections, practically always be found to be immediately above or below and in part connected with a bronchus or blood vessel. Small masses of this tissue are to be seen in the lung of the guinea pig situated chiefly in the forks of dividing bronchi and arteries and nearly always within the loose areolar connective tissue lying immediately around these structures.

Branches of the bronchial artery penetrate these masses of tissue and constitute their sole blood supply. If one refers again to figure 4, it will be evident to him that the mass of lymphoid tissue there illustrated derives its blood supply from the bronchial artery and that the blood is carried away by small pulmonary venous radicles. The figure is a camera lucida drawing of two superimposed sections. It serves as a good illustration of the bronchial artery in its threefold relation: (1) to the bronchial wall, (2) to the vasa vasorum and (3) to the lymphoid tissue of the lung. The apparent smallness of the bronchi is due to the fact that these structures are shown in a state of extreme contraction.

It should be noted that the vasa vasorum and branches of the bronchial artery frequently course in immediate apposition to lymph vessels. From the work of Miller[6] in which he shows a definite blood vascular supply to the lymph vessels of the pleura, and that of Evans[7], proving the same for the lymphatics of the mesentery, the relation found here is strongly suggestive of some such vasa-lymph connection.

METHODS OF STUDY

Various methods were used in this study. All material used was from lungs, the vessels of which were injected in one or another of the following ways:

1. India ink injected into the thoracic aorta which was tied off at the arch close to the base of the heart. The pulmonary artery and veins were also ligated.

2. India ink injected into the pulmonary artery at 50 to 60 mm. of mercury, continued for fifteen minutes, with both the pulmonary veins and the aorta ligated. This gave complete bronchial injection.

3. India ink injected into the aorta (as in 1) and red gelatine in the pulmonary artery (the gelatine was 20 per cent. strength into which mercuric sulphide granules were mixed until a good red color was obtained). The pulmonary vein was ligated. These granules are too large to pass freely through the capillaries.

After injection the lungs were distended with 95 per cent. alcohol which was introduced into the trachea, and the lung was then left in 95 per cent. alcohol for twenty-four hours. Serial sections were cut in celloidin, usually a complete lobe being represented in a series. Some of the injections were made by syringe and some by means of a pressure pump.

SUMMARY

1. In the guinea pig the origin of the bronchial artery differs from that heretofore described for all mammals, in that it arises from a vessel that originates from the right subclavian artery.

2. In the lung there are definite anastomoses between the bronchial and the pulmonary arterial systems.

3. Branches of the bronchial artery form the vasa vasorum of the pulmonary arterial system.

4. The bronchial artery supplies the lymphoid tissue that is situated within the lung.

I am indebted to Dr. William Snow Miller for his generous help and kindly suggestions in the prosecution of this work and the preparation of this paper.

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THE CIRCULATORY RELATIONSHIPS OF EXPERIMENTAL TUBERCLE IN THE RABBIT'S LUNG*

By WILLIAM SNOW MILLER, M.D.

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(Abstract)

It is not my purpose to describe in detail the relation of experimental tubercle to the blood vascular system in the rabbit's lung. I shall only call attention to a single phase of the subject.

In a paper on the vascular supply of the pleura pulmonalis, published in 1907, I made the following statement: "The histological structure of a given organ may differ in animals of different species. . . . Because a given structure, or relation of structures is found in, for example, rabbits, it is no criterion that the same structure, or relation of structures, will be found in rats, and the inverse is true."

Since the time of Reisseissen the lymph nodules scattered along the course of the bronchi have been described as receiving their blood supply from the bronchial artery. In the course of some recent studies I have found that, in the rabbit's lung, these masses of lymphoid tissue receive their blood supply from the pulmonary artery, and not from the bronchial artery.

This has an important bearing on experimental tuberculosis, and explains why, after intravenous inoculation, these masses of lymphoid tissue are hit so hard and so early in the rabbit's lung, while in those animals in which the lymphoid tissue receives its blood supply from the bronchial artery, tuberculosis of the lymphoid tissue is a later development.

*This paper will appear in full in The American Review of Tuberculosis.

AN INVESTIGATION ON THE ACID FASTNESS OF TUBERCLE BACILLI.*

By B. SUYENAGA, M.D.

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Very soon after Koch's discovery of the tubercle bacillus, investigators became interested in the peculiar staining reactions and especially in the "acid fastness" of this organism and this question has occupied investigators up to the present time. Why are these bacilli acid fast, how can this characteristic be modified, is there any relation between the staining reactions and the virulence of the organisms, are some of the questions which have occupied investigators.

Ehrlich, Klein and Marmorek all noted the interesting observation that young tubercle bacilli are not acid and alcohol fast, a fact which Marmorek explains by the hypothesis that they have not yet had time to develop the fatty and waxy capsule the impermeability of which was supposed to be the cause of the characteristic staining reactions. Koch, Borrel, and others have succeeded in extracting acid fast substances from the tubercle bacillus, thus robbing it of its acid fastness without, according to Borrel, robbing it of its power to develop tubercles; Wherry, in experiments with a strain of tubercle bacilli which had become saprophytic probably from long continued cultivation on artificial media, was able to modify the acid fastness by varying the media on which the organism was grown. He states that the culture could be rendered non-acid proof by continued growth under conditions unfavorable to the synthesis of fats and that the culture could synthesize fatty bodies rendering it acid proof when such substances as acetates were the source of carbon.

The investigation partially reported in this paper was started with the idea of determining the relation of the acid fastness of the tubercle bacillus to its power to produce immunity against infection with tuberculosis. Koch and many other workers have interested themselves in the question of an ideal tuberculosis vaccine and some recent workers have endeavored to rob the organisms of waxy substances supposed to be responsible for the acid proofness but at the same time interfering with the absorption of the tuberculosis vaccine.

The author of this paper has used in his work the same strain of tubercle bacilli as was used by Wherry, a culture of which was brought by Dr. Vaughan from Koch's laboratory in 1888 after 106 transplantations. It had been transplanted on artificial media about every two months up to the time when we received the culture in 1912. Since then it has been

*From the Otho S. A. Sprague Memorial Institute and Pathological Laboratory, University of Chicago.

transplanted every two or three weeks. It now shows luxuriant growth in 24 to 48 hours. Its acid fastness is already somewhat reduced and many nonacid fast bacilli are found. In all the experiments described below the smears were stained for three minutes in hot carbolfuchsin, washed and exposed for varying times to a nitric acid solution made by adding 20 cc. of concentrated nitric acid (acidity 70 per cent.) to 80 cc. of water. The times in the acid varied from ten seconds to 60 minutes. Smears were then washed in water, then three minutes in 70 per cent. alcohol and counterstained in Loeffler's methylene blue. The conditions of staining were therefore kept as uniform as possible, the time in the acid wash being the only varying factor.

I. Transplantation of the culture every two days on glycerolagar, the reaction of which was 0.8 acid to phenolphthalin. The transfer was always made from the transparent edge where the growth is younger. It reached the 334th generation in about 19 months. After the 216th generation, five minutes exposure to acid decolorized the bacilli in most cases, although not in all. After the 326th experiment, fifteen minutes exposure to the acid decolorized almost entirely and practically all the organisms stained blue.

II. Glycerol agar of different reactions were used, varying from 1.5 acidity to 2 per cent. alkalinity to phenolphthalin. While these changes of reaction changed the appearance and color of the culture, they had no marked effect on the acid fastness of the bacteria.

III. Non-nutrient media. This was made simply by dissolving 2 g. agar in 100 cc. of distilled water.

Development on this was at first poor, but became better later. Cultures of the 11th generation were totally decolorized by five minutes in the acid and easily stained blue. Those of the 17th to the 34th generation were decolorized in three to five minutes. But the 48 and 49th generations seemed more acid fast. The same kind of curve was noted in a second series of experiments,—there was a gradual lowering of acid-proofness until complete decolorization, generally in ten seconds, with good counterstain of all bacilli was shown in the 24th and 25th generations. After the 54th generation in four tests up to the 59th generation, the cultures became again more acid proof, although fifteen minutes exposure to the acid generally caused complete decolorization.

IV. The so-called ameba media used by Wherry was employed. The formula followed by the author was as follows:

agar	2 per cent.
salt	0.03 per cent.
beef extract	0.03 per cent.
peptone	none

Reaction one per cent. alkaline to phenolphthalin

Similar results to those with non-nutrient agar were obtained. The 11th generation showed marked reduction in acid fastness. In from 17th to 38th generation, the reduction was so marked that in one case,

thirty seconds exposure to acid decolorized the stain perfectly. In 58th and 59th generation there was again an increase in acid fastness.

The same cultures described above were tested with Gram's stain and there was apparently no change in the Gram positiveness of the organism.

SUMMARY AND CONCLUSIONS

1. Rapid transfer and rapid growth of the younger border of colonies of a saprophytic strain did not notably affect its acid fastness. In other words, I was unable as yet by this method to prove that younger cultures are much less acid proof than older ones.

2. The non-nutrient media and the ameba media used by Wherry greatly reduced the acid proofness of this strain but did not absolutely destroy it. Bacilli on these media may become again more acid fast after reaching the lowest stage of acid fastness.

The reactions of culture media within the limits used in these experiments, seem to have no marked effect on the acid fastness of this saprophytic strain.

THE MODE OF GROWTH OF THE TUBERCLE BACILLUS ON FLUID MEDIUMS

By PAUL A. LEWIS, M.D.

Philadelphia

(Abstract)

The growth of the tubercle bacillus on glycerine boullion usually takes the form of a film on the surface indicating that the micro-organism is strictly aerobic.

We have succeeded by selecting cultures showing favorable tendencies in getting a heavy growth on the bottom of flasks of glycerine boullion even when the flasks were filled with the medium. It is, therefore, true that the oxygen requirements of the bacillus are not as high as has been supposed.

In one instance a series of cultures which developed vigorously on the bottom of the flasks formed, after about a year and a half, a heavy surface film thus going through the cycle of changes which is well known as a property of the diphtheria bacillus under appropriate conditions.

FURTHER OBSERVATIONS ON THE INHIBITION OF GROWTH OF THE TUBERCLE BACILLUS BY CHEMICAL COMPOUNDS

By PAUL A. LEWIS, M.D.

Philadelphia

(Abstract)

We have previously found that the azo-dyes as a class inhibit the growth of the tubercle bacillus with a considerable degree of specificity. Among themselves the dyes of this group exhibit great variability in their inhibitory force. The dyes of maximum activity, and there are a considerable number of these, appreciably restrain growth in dilutions of 1-100,000 and 1-200,000. It has been found that a number of such dyes, if they be heated in the boullion to temperatures of 110° C. for twenty minutes, show an increase of activity of ten or more fold. As this applies to certain of the dyes showing the activity which we have regarded as the normal maximum for the group it appears that by this method related substances are formed whose activity is much greater than that of the azo-dyes as we have studied them. The preparation undergoes slight changes in color. The possibility exists in the treatment for very complex chemical changes to take place. These are to be the subject of further study.

SOME OBSERVATIONS WHICH MAY LEAD TO THE CLASSIFICATION OF TUBERCLE BACILLI

By

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During the last four years we have had an opportunity to study many hundreds of isolations of the tubercle bacillus with the object of finding some definite method which might be applied in the differentiation of the various types of human tubercle bacilli. Such an attempt hitherto has met with very little success. The slowness with which the tubercle bacillus grows requires unlimited patience and considerable time. The problem has been attacked in several different ways. The cultural characteristics proved of no value. The differentiation of the types by studying the virulence of the organism was found to be hopeless.

The difficulty of such an investigation in the past has been in the lack of suitable methods of isolation and of cultivation of the organisms in pure culture. The conditions to-day are, however, different. The use of the gentian violet culture media in our hands, has proved of great value in collecting a large number of cultures for such a study.

Some years ago one of us called attention to the behavior of tubercle bacilli when grown on gentian violet media. At that time it was noticed that not every organism isolated behaved alike in such media, for some organisms decolorized the gentian violet, while other organisms had no influence on the media whatsoever. This work has been carried on ever since. Some two years ago, stimulated by the work of Clark and Lubb on the influence of hydrogen-ion concentrations in the culture media we began more intensively to study this problem. After the introduction of the more delicate color indicators having a different range, we decided to try some of these new reagents.

Frothingham recently has published some very interesting observations, using veal broth medium, to which small amounts of brom-cresol-purple and litmus indicators were added. He was able to differentiate bovine and the human tubercle bacilli.

In our work we have used three different media, glycerine egg, glycerine veal, agar and potato broth agar. The determinations primarily of the hydrogen-ion concentration were made electrometrically using a Leed & Northrup potentiometer. The bubbling method and a water bath were used at a constant temperature of 30° C. The media was all adjusted to Ph 7.2, which was the starting point of all the culture media.

After a preliminary study with ten reagents we selected the brom-thymol-blue, phenol-red and cresol-red. We selected these reagents for

the reason that the end reaction was most useful for such a determination.

By this method we have been able to group three different types, which can be determined by the end-point reaction.

There were other difficulties which at present we are trying to overcome. Not all batches of media gave us the same result. If we study the same organism on the same batch of media at different intervals we always get the same results. But as soon as a new batch of media was made the results were different and some times conflicting. It is probable that the contents of proteins, peptons and some other organic and inorganic substances act as a buffer and are responsible for the discrepancy. We are at present trying synthetic media of definite chemical composition, which may be of great value in such investigations.

There is another very interesting observation which we have noted, namely, the ability of tubercle bacilli to split the different carbohydrates. It opens another field, which may prove of value.

This is not a complete investigation, as we are merely presenting a few of our observations with the hope that it may stimulate others interested in the bacteriology of the tubercle bacilli, for it is a big problem.

So far we have not made any attempt to correlate the different types with the clinical course of the disease. At present we are still working on stabilizing the method.

TUBERCULOSIS AND EVOLUTION*

By LIEUT. JOHN PAUL GIVLER, S.C.
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The work of the medical man comprehends two vast worlds. On the one hand is the world of *nature* through which play the forces known to astronomy, physics, chemistry and biology and out of which, in company with a throng of other living forms, we are told, in the language of evolution, that man has emerged. On the other hand lies the world of human society, even more incomprehensible, composed of human individuals, pervaded by thoughts and feelings, and governed by laws of its own.

It is doubtless due to the predominantly human and social bias of medicine that into the study of some if its great general biological problems such as tuberculosis there has been projected to so small an extent the concept of time and its rôle in bacteriology and pathology. The geologist and the biologist, on the other hand, fully realizing the relation of time to the development of systems and forms know that the time perspective adds, as it were, a third dimension to all of their conceptions without which they would appear as a pattern on a flat surface. It is this time relation, together with some evolutionary factors, which we wish to apply to a consideration of tuberculosis looked at somewhat through the eyes of the biologist and paleontologist.

SOME TIME RELATIONS INDICATED BY THE FACTORS CONCERNED IN TUBERCULOSIS

Human pulmonary tuberculosis, with and without general systemic complications, is an old disease. It was known to Hippocrates and probably to Democritus some centuries before the Christian era, and there are undoubted indications of the existence of tuberculosis at a much earlier period, as plainly shown by lesions in Egyptian mummies[1] (Slide 1). Elliot Smith and Ruffer[2] have described and photographed the skeleton of an Egyptian mummy of about 1000 B.C. which clearly shows indications of Pott's disease. It is stated by Cobbett that "Dr. Derry has more recently found a series of similar specimens belonging to the period 3000 to 2000 B.C. or even earlier." So far as we can observe, tuberculosis of the vertebrae has been the same disease through at least forty or fifty centuries and is probably even older (Slide 2). Smith and Jones, in their studies of Nubian mummies found a number of cases of ankylosed vertebrae probably due to tuberculosis of the spine.[3] It follows by analogy that *pulmonary* tuberculosis must be a disease covering

*From the Laboratory of United States General Hospital No. 16.

at least the "sixty centuries of civilization," but there is no reason to believe that civilization started it, whatever new and complex aspect may have been added to a spontaneous disease by the development of the social complex in man.

Along with this fact of the constancy of tuberculous pathology is a companion fact of very great importance. The human tubercle bacillus is a parasite closely adapted to its host. Except for artificial cultivation tubercle bacilli perish unless they find those animals to which they have become adapted by a long process of mutual adjustment. It is probable, therefore, that this mutual adaptation between the human tubercle bacillus and man has continued practically unchanged for at least sixty centuries. It is also impossible for us to believe that it took place through any sudden mutation. It seems more probable that the adjustment had been consumated at a far earlier period for an appreciation of which the time scheme of the geologist must be brought to our service.

In this connection some facts of comparative pathology are of extreme importance. Were tuberculosis a human disease solely we would be unable to trace either the disease or the organism much further back than the period of human civilization. There are, however, a number of other vertebrates spontaneously infected by tuberculosis. Among these are cattle, various birds, reptiles, and probably amphibians and fishes. Of the various types of tubercle bacilli but three have been carefully studied, the human, bovine, and the avian (Slide 3). It was first clearly shown by Theobald Smith[4] that there is a distinct difference between the reaction curve on mediums of the human and bovine strains.[5]

We have now conclusive evidence that these differences continue unchanged for at least twelve years and we have no reason to believe that either strain has developed from the other at any very recent period. The work of Theobald Smith has been corroborated by Grund and Frothingham,[6] the latter using the Bovie potentiometer for determining the reaction of the medium and both brom-cresol-purple and litmus in the indicator method. Frothingham found that the reactions of one strain of human tubercle bacilli H-37 (Saranac) isolated twelve years before gave typical human curves while the bovine strain XXXIII (Smith) revealed the bovine curve. Corper, in unreported experiment, obtained typical human and bovine reactions respectively with strains artificially cultivated for eight years, during which time the reaction curve remained unchanged as were also the cultural characteristics.

This constancy and specificity in the reactions of these obligate parasites is correlated with another factor of great importance (Slide 4). The chemical and serological status of every vertebrate species is doubtless distinct from that of every other species. It may even be true that specific differences among animals inhere in a chemical complex. The work of Reichert and Brown[7] on the specificity of the proteins of many vertebrates with special reference to the crystallography of the hemoglobins is a virgin trail into this highly interesting field and leads the way to more profitable work.

An examination of this work shows that the oxyhemoglobin of no two

vertebrates known to be spontaneously infected by tuberculosis is the same. The inference seems to be justified that if the hemoglobins are different other factors in the chemical and serological status of the species are correspondingly distinct and different. In the light of this important work on the chemical differences between animal species it becomes more apparent that the specific chemical factors and reactions of the bovine and human tubercle bacilli must be correlated with the unique chemistry and serology of the animal species with which each has become intimately associated through long ages as a bacterial parasite.

TYPES OF TUBERCLE BACILLI FOUND IN LOWER VERTEBRATES

It has been known for some time that acid fast rods may cause typical spontaneous tuberculous lesions in birds, reptiles, amphibians and fishes. Dubard reported such from the carp. Kuster[8] described spontaneous tuberculosis in frogs, and Friedmann[9] in turtles. Various other investigators have reported tuberculosis in lizards, snakes, and other cold-blooded animals. Rabinowitsch[10] investigated 55 birds representing many orders in which she found typical tuberculous lesions. As but a small amount of pioneer work has been done on the tubercle bacilli of cold-blooded animals little is definitely known as to their parasitic and other relations. That many clean-cut facts would emerge from further study of these forms is our firm belief and forms a program for extensive research now partially outlined.

More study has been made of avian strains which are certainly different from either the human or the bovine, growing as they do at a temperature of 41° C. instead of 37.5° C. as in the case of the mammalian strains and being also distinct in their reaction curve.

Whether the tubercle bacilli of different cold-blooded vertebrates are the same or are distinct does not appear to be at all clear at the present time and doubtless much work will have to be done in the future in order to clear up this point.

THE RELATION OF TUBERCLE BACILLI TO OTHER ACID FAST RODS

On account of the existence of many saprophytic rod-like acid fast bacteria in nature there are many who believe that tuberculosis of any vertebrate may have been developed within a very recent period. We are inclined to believe, however, that the mere quality of being acid fast has little to do with the question of the relationships of tubercle bacilli to certain saprophytes of similar staining reaction. While it has been shown that local lesions may be produced in animals by means of saprophytic acid fast rods no pathology has thus been induced pointing to any parasitic specificity.

As to the relationships of tubercle bacilli the situation is thus summarized by Besson who states that "It appears to be true that all tubercle bacilli have a common origin." Theobald Smith[11] states that "the

extensive studies on variation among bacteria now before us make it probable that there was a common ancestor from which the human, bovine and avian types have sprung through adaptation to special hosts."

SOME COMPARISONS BETWEEN VERTEBRATE AND BACTERIAL EVOLUTION

(Slide 5.) Like all other living matter, the elements of which were first derived from the sun, bacteria are of extreme antiquity. It is an impressive fact that man, the tubercle bacillus, and the earth, which is the scene of this drama, owe their origin to their common mother, the sun. Further, bacteria, like many other living forms of past ages, have left fossil remains (Slide 6). Coccoid nitrifying bacteria from the Algonkian of Montana, described by Walcott, show practically no difference in form when compared with recent nitrifiers although about 32,000,000 years older.

(Slide 7.) Just when tubercle bacilli first arose no one can now state but the inference seems justified that if nitrifying bacteria have undergone so little form change other bacteria may likewise have been extremely stable in spite of vast stretches of time.

When we compare this constancy of bacterial evolution with that of the vertebrates we see an amazing difference (Slide 8). It is the belief of zoölogists that all higher animals, including the vertebrates and man, sprang from the protozoa, that, from so simple and generalized a form as Amoeba the great phyla of animals (Slide 9), with all their complexity, have branched out during a period in which the bacteria have shown but little form change. It we date the vertebrates from the cambrian, when the fishes (Slide 10) are known to have arisen, we observe in the successive ages following a vast irruption of forms of life. The Amphibians (Slide 11) arose in the Carboniferous and in the Permian the reptiles. The mammals (Slide 12) undoubtedly arose soon after but, on account of the vast development of reptilian life during the Mesozoic, did not find room or opportunity for great development until the dawn of the Caenozoic, the age of mammals. Although this story is easily reviewed in a few sentences it forms a most spectacular chapter in the entire story of evolution. Considering it, as we do, from the human standpoint, interested as we are in a great phylum of which we are members, the spectacle of the embranching hosts of vertebrates (Slide 13) of successively higher grades of organization is one of surpassing interest. Coupled with the fact that we, as students of tuberculosis, have our attention drawn to representatives of each of the great classes of vertebrates, as animals in which typical spontaneous tuberculous lesions appear, it is highly important that we realize what is meant by a fish, a reptile, a bird or a mammal in the light, not merely of recent forms but also in the broader view of the palæontologist.[12]

Out of this consideration comes the view that many present representatives of these lower groups of animals are to be viewed somewhat as "living fossils." In other words, they are persistent remnants of animal

classes which formerly occupied all available space in the kingdom of nature. We believe it to be further a justifiable hypothesis that reptiles, amphibians and other vertebrates have persisted through long ages with much the same chemical and serological character as that which characterized them at periods almost infinitely remote. If this be a view at all tenable we have reason to believe that the various strains of reptilian and fish tubercle bacilli which we now find have remained adapted to their hosts through an almost inconceivably long period. We are led further to this belief through the known facts of the constancy of human, bovine, and avian tubercle bacilli.

As a corollary of great importance to this proposition it seems to us now quite clear on general biological grounds why such a vaccine as that prepared by F. F. Friedmann from turtles could have no possible therapeutic value. The differences in the time-relations and adaptive parasitic factors stamp such attempts at therapy both as "anachronisms" and as a violation of the principle of parasite-host specificity.

Testifying to his belief in the continuity of disease processes throughout the ages Moodie[13] says, "The general processes of pathological conditions will be found to be the same or at least similar in ancient geological times and at the present time." "The human race has inherited some of its troubles at least from the fishes and reptiles which lived many millions of years ago."

Compared to the relatively rapid evolution of animals bacteria, as more conservative organisms, have, as it were, witnessed the rapid evolution of the vertebrates from the lowest forms up to and including man, becoming adapted to hosts as parasites as the hosts successively emerged.

FACTORS DEPENDENT UPON THE EVOLUTION OF PULMONARY RESPIRATION

As vertebrate evolution proceeded a change in habitat, from aquatic to terrestrial, took place. The reptiles underwent a tremendous development into various orders and families and, like the amphibians before them, occupied dry land instead of water as did their piscine ancestors, becoming readapted to life in the water only secondarily. With this development from the environmental standpoint came about profound changes in structure and in organs. The lung arose from what ancestral structures we are not entirely certain and underwent an evolution, from a hollow sac, as we find it in the amphibian, to a somewhat branching structure, as seen in certain reptiles. Finally, with the development of a high body temperature, as found in the warm-blooded vertebrates, we observe a tremendous development of the internal branching system of bronchi and alveoli. It is thus that, as the course of vertebrate evolution led from aquatic vertebrates upward through cold-blooded primitive and finally into highly complicated vertebrates culminating in the mammalia, the pulmonary apparatus underwent an extensive development dominated by the demand for increased oxidation as the warm-blooded forms evolved.

It is evident further on this basis that parasites having a relatively unimportant relation to lower vertebrates may easily, with change in the structure and environmental relations of their hosts, have undergone a marked transformation and entered upon new avenues of relationship with new organs. As transformation in physical constitution and body temperature took place, they could easily have come from the position of being relatively harmless parasites to be foes endangering the life of the individual if not the continuance of the species.

THE EVOLUTION OF MAN

(Slide 14.) Such conditions as those here outlined must certainly have been of importance in those progressive changes which led up to the differentiation of the human stocks with which the pathologist is primarily concerned. Although the fragmentary yet important evidence on the origin of man has never been surveyed from the standpoint of genetic pathology it may be interesting at this time to review the chief stages of this history as they have been gleaned by recent brilliant work in the field of physical anthropology.

The theme of the evolution of man out of an animal ancestry can need no apology. Even among living races there are some, like the Aruntas of Central Australia, which show undoubtedly primitive and ancestral characters. Zoölogically, man is a catarrhine primate who not only emerged from (Slide 15) ancient ape-like stocks but is also related to those now existing. Of those fossils which throw light upon the ancestry of man some are definitely those of apes, others are as certainly human, while still others combine the characters of both. Belonging to this third class is that of the Java ape man (Slide 16) known as Pithecanthropus erectus, a creature who lived about 500,000 years ago. The reconstruction by MacGregor[14] shows this most ancient human and yet ape-like ancestor. Compared with him, the Australian, in the receding character of the forehead and in certain other characteristics, does not differ greatly.

(Slide 17.) The next stage in the evolution of man is that known as the Piltdown man of Sussex, England, discovered by Dawson (Slide 18). By a study of the physiognomy of this ancestor who lived some time between 100,000 and 200,000 years ago we see a visible advance in human characteristics.

Another early race of men is that known as the Neanderthal (Slide 19) which inhabited Central France at a period probably 40,000 to 25,000 years ago (Slide 20). During that period, or perhaps earlier, these races developed the habit of cave living. Next follows a magnificent race known as the Cromagnons (Slide 21), another extinct early branch of the human tree which lived at a period probably 25,000 years ago. They were a race of people of magnificent bodily form whose developing social and mental life found expression in the drawings, many of them in polychrome, found on the walls of their caverns (Slide 22). Although these peoples lived but yesterday from the geologist's standpoint they are still at least four times as ancient as the earliest human history.

We thus, if inclined to view all natural processes as continuous and uniform, may well believe that, during the past 15,000 or 20,000 years, there have come into existence those races (Slide 23) which have acquired a social status into which, from time immemorial, has been carried susceptibility for tuberculosis together with the parasite.

On this general basis alone do we find it possible to frame either a general ethnographic survey of human races in relation to their tuberculous incidence or an analysis of the tuberculosis problem as a cosmic phenomenon.

The presentation of a group of topics such as the foregoing, with the attempt to orientate a human disease in relation both to time and to organic evolution, would scarcely be acceptable without a word of explanation if not of apology. The outline is presented as a general hypothesis which, although based upon a number of well established facts and in harmony with accepted general theories, forms rather the basis for a new viewpoint and a program for research than a body of conclusions now definitely proved.

Biological research in medicine is clearly marked both by the anthropocentric bias as well as by that of immediacy. Neither viewpoint, however, has been effective in the conquest of world-old medical problems for the reason that their relation to man may be an atypical aspect of the general situation.

The use of the comparative method in human anatomy, embryology and physiology has served to establish general scientific principles in the place of the less illuminating views resulting from empiricism. Encouraged by this experience we cannot but feel that the application of similar methods to pathology, bacteriology, and immunology will prove of great value in the further development of these sciences.

It is my pleasure, in conclusion, to acknowledge the many scientific opportunities provided by the Surgeon General during my service in the United States Army at the Yale Army Laboratory School and also as a member of the Laboratory Staff of the United States Army General Hospital No. 16. At the latter institution I am indebted especially to the Commanding Officer, Lieut.-Col. Estes Nichols, and to Major H. J. Corper, Chief of the Laboratory Service, for unstinted aid and generous encouragement.

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CONTINUOUS INJECTION METHOD IN TREATMENT OF EXPERIMENTAL TUBERCULOSIS*

By

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(PRELIMINARY REPORT)

IN 1915, Woodyatt of the Sprague Memorial Institute devised a machine for the continuous, prolonged and accurately timed injection of sugar. This machine has been somewhat altered and refined in the various instruments built since then, but it consists fundamentally "of a glass barrel and a metal piston driven by an electrical motor through worm and gear with a mechanically operated valve and a rheostat control. This machine was described in detail by Woodyatt in the *Journal of Biological Chemistry*, 1917, Vol. XXIX, No. 2. Woodyatt states that "if a soluble diffusible substance is made to enter the living organism at a constant rate for a long enough time, the tendency is toward the establishment of an equilibrium which is manifested by a constancy of the rate at which the organism rids itself of the substance by excretion or chemical change or both. The rate of entry is then equalled by the rate of utilization plus the rate of elimination." By the use of this instrument, Woodyatt, and Wilder and Sansum were able to determine the sugar tolerance of dogs and of human beings, both normal and diseased. They found that normal resting men and women could not utilize but began to excrete abnormal quantities of glucose, when the injection rate was over 0.8 g. and below 0.9 g. per kilogram of body weight, while the tolerance was diminished in pancreas disease, thyroid diseases and diseases of the hypophysis.

Since diuresis was caused when glycosuria was produced, the method was found useful in dehydration of certain tissues in which pressure was too high. Several cases of acute glaucoma, in which the intraocular pressure was so high that an iridectomy was unsafe, had this pressure reduced to a safe level for operation by means of a suitable selection of the rate of glucose injection and hence of the amount of water abstracted in a given time.

Other experimental work has been done on the effect of continuous injections of glucose solution at given rates on blood pressure, pulse volume, etc. Its best and so far most efficient and almost specific use has been in the feeding of cases of starvation acidosis which had reached the

* From the Otho B. A. Sprague Memorial Institute and Pathological Laboratory, University of Chicago.

stage of acitonuria. Sansum reports a number of cases of this kind in which death was imminent because of starvation and inability to retain food administered either by mouth or rectum, but which were saved by a single or several continuous injections of glucose solutions. One of these cases was a carcinoma of the rectum with severe vomiting so that no food could be retained, several others were severe cases of colitis. In all these the effects of the continuous injection of glucose were most satisfactory. Some cases of infection with similar acidosis failed, however, to yield to the glucose treatment.

Since this method of injection of accurately timed doses of soluble substances had been proven safe for human patients, it seemed feasible to use it in chemotherapeutic experiments, especially when the therapeutic value of the drug depends on its bactericidal properties. Dr. Lewis initiated these chemotherapeutic experiments in an attempt to cure experimental pneumococcus infections in rabbits by continuous intravenous injections with ethylhydrocuprein. His report of this work was published in *Archives of Internal Medicine*, 1918, Vol. XXII, p. 593. As he states in an introductory sentence, "The effectiveness of the *in vivo* action of a chemotherapeutic agent, which is used because of its bactericidal properties, in all probability depends on the same factors which operate in the *in vitro* action of a bactericide, the two chief of which are the time factor and the concentration factor." Although Dr. Lewis was able to produce a bactericidal concentration of the ethylhydrocuprein in the rabbits' serum, he was unsuccessful in his effort to cure his rabbits infected with the virulent pneumococci. In spite of the failure in treatment of the acute pneumococcus infection by this method, it occurred to us that it might prove of value in our chemotherapeutic experiments on the much more chronic experimental tuberculosis. While bactericidal or even inhibitory power is by no means the only or even perhaps the most important factor in chemotherapy of tuberculosis, it is nevertheless one of the factors to be considered and many of the substances used have a high inhibitory value in the test tube. If it fails to inhibit the growth of the same bacilli in the animal body, may it not be because it is rapidly excreted or rapidly changed chemically, so that by the ordinary methods of administration it is impossible to maintain an inhibitory or bactericidal concentration in the blood or in the body long enough to accomplish its purpose. As noted by Lewis: "In our usual methods of administering a drug the curve representing the concentration of the substance in the blood at different intervals will be in the form of a wave. The steepness of the ascent and descent of the wave will depend on the ratio of the rate of absorption and the size of the dose to the chemical destruction + the chemical combination + the excretion. The length of time during which the drug is effective will depend on the shape of the curve and the concentration at which the drug can be effective. (See curve figured in report by Lewis cited above.) Let this figure represent the curve of concentrations which follow the intravenous injection of the largest possible dose of a drug which will not cause toxic symptoms. At once the concentration in the blood rises from zero to the point *a*. Let it

be supposed that the three factors mentioned operate so that the concentration decreases at the rate represented by the descending portion of the curve. If the concentration at which the drug is effective is at *a*, it is effective only a short time, but if it is active at *b*, it is effective much longer, and so on, the time of effective action depending on the height of the wave, the rate of its decline and the concentration of activity. An ideal drug can be pictured in this way showing that such a drug could obtain a high concentration because of its non-toxicity, would be slow in decreasing this concentration and would be highly active at a low concentration. According to the curve, if the drug was active at the concentration *b*, there are two ways in which the time of action could be lengthened: One, by repeating the original dose or fractions thereof, whenever the concentration fell to *b*. Schematically the concentration in the blood would then be represented by a series of small waves. The second way to maintain an effective concentration would be to introduce the drug continuously at a rate which would strike an equilibrium with the rate of operation of the factors which decrease the concentration. In this way, the concentration would be schematically represented by a straight line. Since Lewis of Philadelphia and DeWitt had both shown that methylene blue has a high power of inhibition of the tubercle bacillus, and since some of my chemotherapeutic experiments had indicated that the dye has some therapeutic power, methylene blue in the form used in the United States pharmacopeia was chosen for our first experiments. (For representation of machine used by us, see plates in Woodyatt's report referred to in beginning of this paper.)

In the earlier experiments rabbits inoculated with bovine tuberculosis were used, but were found unsuitable; in the later experiments, therefore, dogs having experimental bovine tuberculosis have been used. Varying concentrations of methylene blue, from 1 to 500 down to 1 to 3000, have been used, the solutions being made up with physiologic salt solution. The local toxic action in the rabbits was so severe that the ears became swollen and gangrenous and often dropped off, the animals dying often apparently from the effects of the local necrosis. The dogs injected for six hours 0.2 cc. per kilogram of body weight per minute with a concentration of 1 to 500 rarely lived more than 24 hours. The blood of these dogs, drawn immediately after the injection and added to equal parts of glycerol agar, inhibited the growth of the same strain of bovine tuberculosis as was used in the experiments, although normal blood in the same concentration gave a luxuriant growth. The inhibitory power of methylene blue alone on this strain of bovine tubercle bacillus was much less than that shown toward human tubercle bacilli, since a concentration of one part of methylene blue to 1000 parts of glycerol agar was necessary to cause complete inhibition of growth. If normal dogs' blood was added to the glycerol agar in equal parts, however, the growth was completely inhibited by 1–5000 concentration of methylene blue and almost completely by 1–50000 and 1–100000. However, since this strain seems peculiarly resistant to methylene blue, further experiments will be run, using a less resistant strain. In future experiments also, other conditions

will be modified in the effort to prolong the life of the animals, since, even with the weakest concentrations used, few of the animals have lived so long as the controls or even long enough to develop a definite tuberculosis. The experiments so far carried on, however, have given us a basis for further work and we have planned a campaign in which this method will be used for the introduction of various drugs into tuberculous animals.

The method of continuous injection seems worthy of serious consideration and it is for the purpose of introducing the method rather than of giving any results that this paper has been presented to you.

THE INFLUENCE OF ANAESTHESIA ON EXPERIMENTAL TUBERCULOSIS IN GUINEA PIGS

By LAWRASON BROWN, M.D. and S. A. PETROFF

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There has geen great opposition to the use of general anaesthesia in patients suffering from pulmonary tuberculosis on the part of many tuberculosis specialists. They affirm that patients who are subjected to this procedure afterwards often do badly. On the other hand at some of the best clinics where minimal quantities of ether are used, it is stated that the pulmonary tuberculosis is affected but little. It is of course with interest that we noted Sawyer's suggestion that ether anaesthesia be used in the treatment of tuberculosis. The bad results that follow some anaesthesias during which operations are performed are not to be attributed, he thinks, to the anaesthesia but rather to the operation. He published a number of clinical observations. Later Corper attempted to reduce the resistance of tuberculous guinea pigs to their tuberculosis by the administration of ether to the point of anaesthesia every day for 15 days, and later to a second series every day or every other day as long as consistent with the life of the animals. He found that light ether anaesthesia did not increase the susceptibility of guinea pigs to tuberculosis. Chloroform, while highly toxic to guinea pigs, produced no effect upon the course of the tuberculosis.

First Experiment

Twelve guinea pigs, weighing between 350 and 400 grams, were injected with 0.5 cc. of a faint suspension of human tubercle bacilli (H 37) on June 5, 1917. Two weeks later these guinea pigs were divided into three groups of four guinea pigs each, and used one for ether anaesthesia, one for chloroform anaesthesia and one for controls. Full anaesthesia was produced once a week and maintained for 20 to 30 minutes on June 17, 26, July 3, 10, 17, 24 and 30.

The results of this experiment are shown in Table I. Chloroform was too toxic for the guinea pigs but apparently produced no increased amount of tuberculosis though, as the animals lived such a short time, it was difficult to determine this accurately. The etherized group lived longer than the controls (396 against 306 days), showing that the etherization had at least no injurious effect, but the difference was not enough to state any beneficial results from the anaesthesia.

Second Experiment

This experiment was the same as the first but anaesthesia was produced every four days. The guinea pigs were inoculated May 2, 1918, and anaesthesia produced on May 15, 19, 23, 27, 31 and June 4 and 8.

EXPERIMENT I

No.	Anesthetic	Date of Death	Days of Life	Degree of Tuberculosis	Autopsy
E 1	Ether	2-IX-17	90	+++	Lungs, liver and spleen with masses of tubercles. Glands enlarged and positive to acid fast bacilli.
E 2	Ether	30-IX-17	118	+++	Lungs with few tubercles. Liver with masses of conglomerate tubercles. Spleen enlarged and nodular. Glands enlarged and positive to acid fast bacilli.
E 3	Ether	7-X-17	125	++++	Lungs apparently free from tubercles. Liver with few tubercles. Spleen enlarged with many tubercles.
E 4	Ether	6-VIII-17	63	+++	Lungs apparently free from tuberculosis. Liver with few tubercles. Spleen enlarged with many tubercles. Glands enlarged and positive to acid fast bacilli.
CH 1	Chloroform	19-VI-17	died on table 1st day of anesthet.	?	Questionable tuberculosis.
CH 2	Chloroform	9-VII-17	35	+	Guinea pig emaciated. Lungs and liver apparently free from tubercles. Spleen enlarged and nodular. Glands enlarged and positive to acid fast bacilli.
CH 3	Chloroform	15-VII-17	41	+	Guinea Pig emaciated. Lungs and liver apparently free from tubercles. Spleen enlarged and nodular. Glands slightly enlarged and positive to acid fast bacilli.
CH 4	Chloroform	19-VI-17	died on first anaesthesia	?	Questionable tuberculosis.
CON 1	Control	29-VII-17	55	+++	Generalized tuberculosis. Lungs with few tubercles. Liver free from tubercles. Spleen enlarged with many tubercles. Glands enlarged and positive to acid fast bacilli.
CON 2	Control	25-VIII-17	82	++++	Generalized tuberculosis. Lung, liver and spleen solid masses of conglomerated tubercles. Glands enlarged and positive to acid fast bacilli.
CON 3	Control	15-IX-17	103	+++	Generalized tuberculosis. Lungs, liver and spleen with many masses of tubercles. Glands enlarged and positive to acid fast bacilli.
CON 4	Control	9-VIII-17	66	++	Moderate generalized tuberculosis. Lungs and liver with few tubercles. Spleen enlarged with many tubercles. Glands enlarged and positive to acid fast bacilli.

EXPERIMENT II

No.	Anesthetic	Date of Death	Days of Life	Degree of Tuberculosis	Autopsy
E 5	Ether	9–VII–18	69	+++	Many conglomerate tubercles in the liver. Very few tubercles in the lungs. Spleen enlarged and nodular. Glands enlarged and positive to acid fast bacilli.
E 6	Ether	21–VIII–18	112	+++	Same post-mortem findings as E 5 (above).
E 7	Ether	29–VIII–18	120	++++	Many tubercles in the lungs and liver. Spleen enlarged and nodular. Glands enlarged and positive to acid fast bacilli.
E 8	Ether	28–VII–18	88	+++	Moderate tuberculosis of the lungs. Liver a solid mass of tubercles. Spleen enlarged and nodular. Glands positive to acid fast bacilli.
CH 5	Chloroform	24–VI–18	54	++	Guinea pig emaciated. Spleen enlarged with few tubercles. Lungs apparently free of tubercles. Inguinal glands enlarged and positive to acid fast bacilli.
CH 6	Chloroform	13–VI–18	43	+	Guinea pig emaciated. Spleen enlarged with few tubercles. Lungs and liver free from tubercles. Glands enlarged and positive to acid fast bacilli.
CH 7	Chloroform	19–VI–18	49	+?	Guinea pig emaciated. Spleen enlarged and nodular. Lungs and liver free from tubercles. Glands slightly enlarged. No acid fast bacilli.
CH 8	Chloroform	1–VII–18	61	++	Guinea pig emaciated. Spleen enlarged with few tubercles. Lungs and liver apparently free from tubercles. Glands enlarged and positive to acid fast bacilli.
CON 5	Control	5–VIII–18	96	+++	Generalized tuberculosis. Lungs and liver with many tubercles. Spleen enlarged with many tubercles. Glands enlarged and positive to acid fast bacilli.
CON 6	Control	16–VII–18	76	+++	Generalized tuberculosis. Lungs and spleen with many tubercles. Liver with few tubercles. Glands enlarged and positive to acid fast bacilli.
CON 7	Control	21–VIII–18	112	++++	Generalized tuberculosis. Lungs, liver and spleen with masses of tubercles. Glands enlarged and positive to acid fast bacilli.
CON 8	Control	18–VIII–18	109	++++	Generalized tuberculosis. Lungs and spleen with masses of tubercles. Few tubercles in the liver. Glands enlarged and positive to acid fast bacilli.

EXPERIMENT III

No.	Anesthetic	Date of Death	Days of Life	Degree of Tuberculosis	Autopsy
E 9	Ether	9-II-19	131	+++	Tuberculosis of the liver. Spleen enlarged, inguinal glands enlarged. Bronchial and iliac also enlarged. Few tubercles in the lungs. Acid fast bacilli.
E 10	Ether	3-IV-19	183	++++	Tuberculosis of the liver. Spleen enlarged, inguinal glands enlarged. Positive to acid fast bacilli. Iliac and bronchial glands very much enlarged. Few tubercles in the lungs.
E 11	Ether	29-XII-18	89	++++	Very slight tuberculosis of the lungs. Liver enlarged and caseous. Spleen enlarged. Glands enlarged and positive to acid fast bacilli.
CH 9	Chloroform	20-X-18	18	?	All chloroformed guinea pigs died on the fifth anaesthesia, due very likely to the toxicity, of the chloroform.
CH 10	Chloroform	20-X-18	18	?	
CH 11	Chloroform	20-X-18	18	?	
CON 9	Control	16-II-19	138	++++	Generalized tuberculosis. Conglomerate tubercles in the lungs and spleen. Glands enlarged and positive to acid fast bacilli.
CON 10	Control	21-I-19	112	++++	Generalized tuberculosis. Few tubercles in the liver. Extensive tuberculosis of the lungs and spleen. Glands positive to acid fast bacilli.
CON 11	Control	7-I-19	98	++++	Generalized tuberculosis. Many tubercles in the liver, and lungs. Glands enlarged and positive to acid fast bacilli.

The results noticed in Table II show an experience with chloroform anaesthesia similar to that in the first experiment. Here the controls and etherized animals lived almost exactly as long (393 against 389 days). In this experiment the etherization seemed to exert no influence.

Third Experiment

As Corper's results had been published after the first two experiments, it was deemed wise to use this method in a third series of guinea pigs, which were inoculated October 2, 1918, with a faint suspension of human tubercle bacilli (H 37). On October 16 and every day thereafter for 15 days ether and chloroform were administered to the point of light anaesthesia.

Here again the toxic effect of chloroform for guinea pigs was strikingly shown. The etherized animals outlived the controls (403 against 348 days). The tuberculosis was equally extensive in both sets.

DISCUSSION AND SUMMARY

From this experiment it appears that ether anaesthesia, whether prolonged or of short duration, whether light or profound, exerts on tuberculous guinea pigs no injurious effect as noted in length of life or extent of disease. Chloroform has a highly toxic influence. Slight evidence can be drawn from these experiments to show that etherization exerts any beneficial influence on experimental tuberculosis in guinea pigs.

THE MICROÖRGANISMS, ESPECIALLY PNEUMOCOCCI AND STREPTOCOCCI, IN THE SPUTUM AND BLOOD OF CASES OF PULMONARY TUBERCULOSIS*

By

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The subject of "mixed" or "secondary" infection in phthisis has interested tuberculosis workers even from the time of the inception of the study of the pathogenic bacteria and, like a great many highly interesting subjects in medicine, has led to a great deal of investigative work with results leading to diametrically opposite conceptions. The literature on this subject has been voluminous but the development of new methods of investigation and advanced conceptions in the light of new discoveries in other branches of medicine seems to justify reinvestigation of an old subject. This seems desirable in view of the discovery of the immunological classification of pneumococci which paved the way for the development of the serum treatment for lobar pneumonia by Rufus Cole and his co-workers of the Rockefeller Institute. An excellent, complete, recent resumé of the literature on "mixed" and "secondary" infections in pulmonary tuberculosis is given by Avery and Lyall[1] who point out that the predominating organisms found in the sputum are the streptococcus, the pneumococcus and the staphylococcus. These organisms are present in the sputum of a sufficient percentage of cases of pulmonary tuberculosis to warrant consideration.

The presence of these same microörganisms in the mouth of normal individuals is well known, and yet no significance from a pathological standpoint is attributed to them. The question as to when to attribute a pathological significance to these organisms is one not easily answered so that recourse must be had to some other criterion than that of their mere presence in the sputum and incidentally, lungs. To be sure, a mere febrile reaction, considering that such can be caused by the tubercle bacillus alone, also cannot be considered a criterion. The well known tendency of the pneumococcus and streptococcus to invade the blood stream might here aid us. Avery and Lyall, in tabulating the blood findings of cases of pulmonary tuberculosis up to 1912, conclude as a result that a fairly large percentage (15.7 per cent.) harbor organisms in the circulating blood. In their analysis of these figures, however, the

*From the Laboratory of United States Army General Hospital No. 16, New Haven, Conn.

high percentage is accounted for especially by the findings of two sets of observers, Pettit[2] in 1911 reporting 46 per cent. positives, and Brown, Heise and Petroff[3] in 1913 reporting 26 per cent. positives. Avery and Lyall in 1913 and Hall and Harvey[4] in 1916 were unable to corroborate these findings and conclude that the methods which give high percentages of positive results in the bacteremia of pneumonia and endocarditis are incapable of demonstrating a similar condition in pulmonary tuberculosis, even when the latter is presumably accompanied by severe infection.

In view of the differences in opinion of these two sets of investigators and the new opportunities offered by the recent discoveries on the pneumococcus and pneumonia, it seemed desirable to study the consumptive again to determine the types of streptococci and pneumococci (typing the latter) harbored in the sputum with a view to their possible source of danger to the host as in other respiratory diseases, and to determine the relation of the organism in the sputum to that in the blood with a view

TABLE I

Secondary Organisms (Pneumococci and Streptococci) in the Sputum of Cases of Pulmonary Tuberculosis*

Classification			Pneumococcus Type				Streptococcus Type			Negative for Pneumococci or Streptococci	Percentage plus Pathogenic Pneumococci or Streptococci
			I	II	III	IV	Hemolytcus	Viridans	Saprophyticus		
Incipient	Tubercle bacilli	+	0	5	6	7	1	1	4	14	36
		−	0	5	6	15	0	8	5	27	29
	Temperature	+	0	0	1	2	0	0	1	1	20
		−	0	10	11	20	1	9	8	40	30
	Rales	+	0	9	7	14	1	6	7	21	35
		−	0	1	5	8	0	3	2	20	23
Moderately Advanced	Tubercle bacilli	+	1	2	6	7	2	3	5	12	42
		−	1	0	0	5	1	7	8	16	23
	Temperature	+	0	1	3	5	2	1	0	8	35
		−	2	1	3	7	1	9	13	20	28
	Rales	+	2	2	6	12	1	9	11	23	30
		−	0	0	0	0	2	1	2	5	30
Far Advanced	Tubercle bacilli	+	0	3	4	9	1	0	3	8	27
		−	0	0	1	2	0	1	0	4	25
	Temperature	+	0	3	3	4	1	0	0	5	43
		−	0	0	2	7	0	1	3	7	15
	Rales	+	0	3	5	11	1	1	2	11	29
		−	0	0	0	0	0	0	1	1	

*NOTE: In figuring the percentage pathogenic pneumococci and streptococci, the following were considered the pathogenic varieties—pneumococcus Type I, II and III, Streptococcus *hemolyticus* and *viridans*. The figure given is the percentage of these as compared to the total number in each class.

to applying the serum treatment of Cole to the Type I infections as determined by the bacteremia if such were encountered.

The sputum and bloods from 216 patients with pulmonary tuberculosis† were examined and classified as shown in Table I noting the types of streptococci and pneumococci found, the presence or absence of tubercle bacilli in the sputum (open or closed cases), the presence or absence of temperature and the presence or absence of rales.

A study of Table I brings out the following interesting points: That the tuberculosis colony studied, representing soldiers who have been sent in from all parts of the United States and the western part of Europe, harbored in their sputum relatively few Type I pneumococci or hemolytic streptococci, the predominating pathogenic organisms, besides the tubercle bacillus, being Type II and III pneumococci and streptococcus viridans. If the percentage pathogenic pneumococci and streptococci is considered from the standpoint of open or closed cases, there seems to be little difference between these or the early and late cases of marked pulmonary involvement.

The same is true when the cases are considered from the standpoint of the presence of rales. Cases with temperature on the other hand show a slightly higher percentage of pathogenic pneumococci and streptococci in the sputum of far advanced cases than in that of early cases, the difference is, however, not sufficiently great to warrant any far reaching conclusions but may merely be suggestive.

The studies of the sputum in pulmonary tuberculosis definitely indicate the presence of pathogenic varieties of pneumococci and streptococci in about 30 per cent. of the cases studied, but in view of the lack of conclusive evidence of such data alone, and the well known propensity of these organisms to enter the circulating blood, the blood findings should be indicative.

The blood examinations during life of the 216 cases from a practical standpoint were negative, the only organisms found in a few of the cases being the staphylococcus (a possible contaminator), in four, the pneumococcus Type II in one, the micrococcus tetragenous in one, and the pneumococcus IV and streptococcus in one case (in bouillon only, never in solid mediums). In striking contrast were the blood culture findings obtained by the authors in the same class of patients during the influenza epidemic, when, in cases presenting definite influenza as proved correct by subsequent postmortem, the blood cultures were found to be positive, usually for pneumococci in 40 per cent. of the cases. At postmortem on eight of the 216 cases dying during the course of these investigations bacteria were recovered from the blood in only one case—a pneumococcus Type II which was also the organism found in the sputum of the same case before death.

In order to obtain more information on the significance of the microorganisms in the sputum of cases of pulmonary tuberculosis, and since the pneumococcus and streptococcus, the predominating pathogenic

† The methods and complete data were published in the *Journal of Infectious Disease*, 1919, xxiv, p. 496–504.

organisms found are pathogenic for mice, it was deemed advisable to study the sputums by injecting them into mice intraperitoneally, noting the effect on the mice, culturing and typing directly from the peritoneal fluid and comparing these results with those given above by direct culture methods. It was further decided to compare the sputums with the salivas of the same consumptives and with the saliva and sputum from individuals free from abnormal clinical pulmonary conditions.*

The sputums from 57 definite cases of pulmonary tuberculosis, 29 far advanced (all but one open) cases, 24 moderately advanced (all open) cases, and four incipient (two open) cases were examined and the results given in Table II.

TABLE II

Results of the Injection of the Washed Sputum of Cases of Pulmonary Tuberculosis into Mice

Classification		Tubercle Bacilli in the Same Sputum		Mouse Result 0.05 cc.				Mouse Result 0.5 cc.				Pneumococcus Type*			Streptococcus	Negative Peritoneal Fluid†
				Not Fatal	Fatal within			Not Fatal	Fatal within							
		+	−		1 day	1–2 days	Over 2 days		1 day	1–2 days	Over 2 days	II	III	IV		
Incipient 4 cases	Afebrile	1	3	4	0	0	0	3	0	1	0	0	0	2	0	2
Moderately advanced 24 cases (all open cases. One died in 1 month)	Febrile	7	1	7	0	1	0	6	0	1	1	1	1	1	0	5
	Afebrile	9	7	12	0	2	2	5	3	7	1	3	2	8	1 Streptococcus Viridans	2
Far advanc. 29 cases (all open except 1.8 died in 2 mo. after exam. were made	Febrile	18	6	20	0	1	3	14	4	6	0	2	3	9	0	10
	Afebrile	4	1	3	0	1	1	0	1	3	1	0	1	3	1 Streptococcus hemolytic with Type IV pneumococcus	0
Totals		39	18	46	0	5	6	28	8	18	3	6	7	23	2	19

* No Type I pneumococci were found in this series.
† The peritoneal fluid in these cases proved sterile on blood agar plates.

The results in Table II agree well with the findings obtained by the direct cultivation of the washed sputums. The percentage, 33 per cent. (of 57) sputums negative for pneumococci or streptococci by mouse inoculation agrees with the percentage 37 per cent. (of 216) sputums negative for the same organisms by direct cultivation. It is noteworthy also that a small percentage (4 per cent.) of streptococcus hemolyticus

* The technic and complete data will appear in the *Journal of Infectious Diseases*.

and streptococcus viridans were found in the sputum while the predominating microörganisms were pneumococci especially Type III and IV, some Type II but no Type I.

In order to note any difference between the microörganisms harbored in the sputum and saliva of cases of pulmonary tuberculosis and in the sputums (if we may consider such) and saliva of normal individuals, a series of injections was made into mice with material obtained from 21 normal individuals (negative by all clinical and laboratory methods available from abnormal respiratory tract findings) and for comparison from ten cases of pulmonary tuberculosis. The results are given in Table III.

TABLE III

Comparison of the Results of the Injection of Saliva and Sputum from Normal Individuals and Open Cases of Pulmonary Tuberculosis into Mice

Classification	Specimen	Mouse*				Pneumococcus Type		Negative Peritoneal Fluid
		Not Fatal	Fatal within					
			1 day	1–2 days	over 2 days	III	IV	
Normal Individuals	Sputum	11	7	3	0	2	12	7
21 Cases	Saliva	8	9	3	1	2	14	5
Pulmonary† Tuberculosis 10 cases	Sputum	8	1	1	0	1	4	5
	Saliva	6	2	2	0	1	4	5

* The sputum was injected in 0.05 cc. and 0.5 cc. amounts and the saliva in 0.1 and 1 cc. amounts—only the larger injections are recorded for obvious reasons.

† Unfortunately four of the cases of pulmonary tuberculosis chosen had previously given negative findings in the experiment recorded in Table II and, therefore, these results are not valuable for comparing with the findings in normal individuals but rather only for comparing the findings in sputum and saliva of the same cases.

The findings in Table III reveal very little difference between those obtained from the sputum and saliva of normal individuals, the organisms found being Type III and IV pneumococcus. Unfortunately, the ten cases of pulmonary tuberculosis examined did not prove entirely satisfactory for the sake of comparison with the normal cases but it is easily apparent that the organisms found in the saliva of cases of pulmonary tuberculosis are identical with the ones found in the sputum and, like those found in normal saliva, are predominantly Type III and IV pneumococci.

SUMMARY AND CONCLUSIONS

The microörganisms isolated from the sputum of open cases of pulmonary tuberculosis by direct culture methods are of a large variety, the

most common of which are pneumococci and streptococci. Of the so-called pathogenic pneumococci and streptococci the most common are the Types II and III pneumococci and streptococcus viridans while only a few Type I pneumococci and streptococcus hemolyticus are found. The results obtained by mouse inoculation corroborated to a great extent the findings by direct culture in that the main pneumococci found were Types III and IV and some Type II but no Type I. A few streptococcus hemolyticus and streptococcus viridans were also found. The types of pneumococci found are, therefore, in the terms of Pritchett and Stillman,[5] the saprophytic types found in normal mouths and the bronchopneumonia of influenza in contradistinction to the Type I and certain Type II pneumococci associated with over 60 per cent. of the cases of lobar pneumonia. As a whole the microörganisms found in the sputum from open cases of pulmonary tuberculosis by mouse inoculation differed little from those found in the saliva of the same cases and the sputum and saliva from normal individuals.

Combining these findings with the fact that blood cultures are usually negative even in cases of ulcerative tuberculosis, the following reasoning seems justified, that secondary microörganisms found in the sputum of cases of pulmonary tuberculosis ordinarily play an insignificant part in the pathogenesis of this disease. As far as the presence of these secondary organisms in the lung are concerned, they are to be considered more as would their presence in any other non-tuberculous disease revealing a condition of lowered local resistance which makes possible a saprophytic residence of these microörganisms. Just why the so-called parasitic types of Pritchett and Stillman are rarely found remains to be discovered as does also the infrequent occurrence of lobar pneumonia (due to pneumococcus Type I and certain Type II) in pulmonary tuberculosis.

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STREPTOCOCCUS HAEMOLYTICUS IN TUBERCULOUS LUNGS

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The prominence given to secondary invaders of the lungs, as impressed by bacteriological findings in our army hospitals during the measles-pneumonia epidemics, and later all over the country during the pandemic of influenza, has largely been directed toward the haemolytic streptococcus. Its importance in tuberculous lungs was stressed years ago by many writers, and at the same time Fraenkel and Troje, Baumgarten and others tried to minimize the importance of these secondary invaders. These early workers found in the cavities and caseous areas of a large number of cases an organism which they called streptococcus pyogenes, but the pneumococcus was a frequent invader, and the surprising thing in our work has been the practical absence of the latter. It is not to be expected, however, that the same organism will be the principal secondary invader of tuberculous lungs in all sanatoria, for the great variety of organisms associated with the pneumonias following influenza has been striking.

The figures to be presented in this paper have accumulated from the bacteriological findings in cultures taken routinely at autopsies. Cultures were taken at nearly every autopsy from the lungs, especially from cavities, caseous and gray consolidated areas, from the heart's blood and various exudates. The materials were streaked on blood agar plates and planted in broth. Streptococcus haemolyticus was identified by its chain formation and principally by its small rounded colony surrounded by a wide zone of haemolysis with no apparent greening. An attempt was made to identify all organisms as far as it was possible in the busy routine. The finding of B. influenzae was not accepted until the organism, which grew in typical colonies on blood agar, refused to grow on plain agar in 24 hours. Greening colonies were always tested for solubility in bile.

This review covers the bacteriological findings in 62 cases, all of which were cultured, of 67 consecutive autopsies. Cultures were made from 47 lungs; streptococcus haemolyticus was found pure 9 times, with B. influenzae alone twice, with B. influenzae and other organisms 4 times, and with various other organisms 16 times. However, of these 47 lungs cultured, only 44 were tuberculous. B. influenzae was found pure twice and with organisms other than streptococcus haemolyticus twice. Staphylococcus aureus was found 7 times, once pure, and albus 15 times, always

with other organisms. Of the non-tuberculous lungs cultured, one showed no growth, one haemolyticus streptococcus pure, and one streptococcus haemolyticus with B. coli.

There were a great many cavities in these lungs and cultures were made from 25 of these. Streptococcus haemolyticus was found pure in 7, with B. influenzae in 2, with other organisms in 9. It was interesting to find B. influenzae pure twice and with organisms other than streptococcus haemolyticus 3 times. Other organisms were found 28 times, including pneumococcus type II once, streptococcus viridans once, and a non-haemolytic streptococcus twice. Usually several organisms were recovered from these cavities but it is striking to find 10 of the 25 giving pure growths, 7 times streptococcus haemolyticus, twice B. influenzae, and once a haemolytic staphylococcus. No cavity which was cultured was sterile.

Materials from the caseous portions of caseous broncho-pneumonia were cultured 35 times. Streptococcus haemolyticus was found pure 13 times, with B. influenzae alone 5 times, and with other organisms 6 times, a total of 24 out of 35. No growth resulted on 6 occasions. Pneumococcus type IV and a non-haemolytic streptococcus were each found once, and streptococcus viridans twice. Haemolytic staphylococcus albus was cultured pure once, and aureus alone 3 times.

Pus from the trachea or bronchi was inoculated on media in 10 cases. Streptococcus haemolyticus was found pure twice, with B. influenzae alone 3 times and with other organisms twice. Pneumococcus types II and III were each found once.

Empyema was found in this series 12 times, the fluid in 5 cases being described as sero-fibrino-purulent, and in the others as pus. We have the bacteriological records of 10 of these. Seven showed pure haemolytic streptococcus; from one B. coli was grown and it was also found in the lung; and 2 had an overgrowth of a proteus-like organism. In 6 of these cases, there was pulmonary tuberculosis, in 2 of which caseous pleurisy was also found; 2 others showed caseation of the serous membranes; and 2 were acute clinical empyemata.

Pleural effusions of the serous type were cultured in 17 cases. Streptococcus haemolyticus was found pure in 7, the only times it was found. No growth occurred in one case.

Blood from the heart and fluid from the pericardial sac were cultured 44 and 39 times respectively. No growth resulted from the heart blood 12 times; streptococcus haemolyticus was isolated pure 9 times, with B. influenzae once, a remarkable finding, and with other organisms 6 times, or in 16 of 32 infected specimens. B. influenzae with staphylococcus albus was found once. Pneumococcus was never found. Staphylococcus aureus was found pure once, in a case of septicaemia by that organism. Streptococcus viridans and a non-haemolytic streptococcus were each found once with other organisms. Most of these cultures were taken many hours after death. Of the 39 pericardial fluids, 18 were sterile, and streptococcus haemolyticus was isolated pure 8 times, and with other organisms 4 times. B. influenzae was never found in it, the pericardial fluid not

being cultured in the case in which B. influenzae and haemolytic streptococcus were found in the heart's blood.

The gray consolidated portions of caseous broncho-pneumonia were cultured 8 times and streptococcus haemolyticus was found pure in 4 and once with B. influenzae and staphylococcus aureus. B. influenzae and another organism were found once, and pneumococcus type IV pure once. Cultures were made of pus drops expressed from the lung in other cases 6 times, and streptococcus haemolyticus was found pure twice, with B. influenzae once and with another organism once. B. influenzae was again found once mixed with another organism.

A survey was made in some of the infirmary wards which contained the sickest patients and on some of the patients on arrival at the receiving wards. Blood agar plates were inoculated with swabs from the throats in 346 instances, and from washed sputa from the same men 343 times. The swabs gave 231 positive haemolytic streptococcus, or 66 per cent., and the sputa gave 202, or 58 per cent. Of the swabs, 22 were "repeats" made a month later, and 2 which were negative in the first instance were again negative, while 19 which were negative first were now positive. Of negative sputa, 16, which were recultured, were now all positive for the streptococcus. In this small number, which included most of the negative cases on the first culturing in 3 wards, this is good evidence of bed-to-bed infection with the streptococcus. It was thought that the patients in the hill, or convalescent, wards would not harbor this organism to the same extent, but this expectation was not borne out, for, of these patients in one ward, the swabs gave 19 positive and 2 negative, and the sputa 16 positive and 4 negative. But their plates did not show as much haemolysis as those inoculated with material from I–3, a ward of very sick men. Neither was the expectation that there would be marked differences between the swab and the sputum results borne out. Haemolytic streptococcus was carried by a large number of patients to this hospital, for of 138 patients swabbed at the receiving ward on entrance, 97 or 70.2 per cent. were positive, and of their sputa, 88, or 63.7 per cent., were positive for the streptococcus.

In attempting this survey of the prevalence of the streptococcus in a carrier state in these patients, it was hoped that it might be possible to segregate, in at least a few of the worst wards, the carriers from the non-carriers. This idea has not had a fair trial and, as might be anticipated, it has had no apparent effect on the frequency of this organism at autopsies. Bed-to-bed infection was noticed.

SUMMARY

Forty-four tuberculous lungs were cultured and streptococcus haemolyticus found 29 times, 8 times pure. Of these, it was found in 25 cavities cultured 18 times, pure 7 times. In 35 caseous areas cultured, it was found 24 times, pure 13 times. In 10 specimens taken from tracheal and bronchial pus, it was found 7 times, pure twice. Seven of 10 empyemata contained pure streptococcus haemolyticus, and with 6 of these there was pulmonary tuberculosis. The same organism was isolated pure in 7 of

17 serous pleural effusions. In 32 cases with infected heart blood, it was isolated 16 times, of which 9 were pure cultures. It occurred pure in 8, and mixed in 4, of 18 infected pericardial fluids. It was found pure 4 times in 8 cultures of gray consolidated portions of caseous bronchopneumonia and twice pure in pus expressed from tuberculous lungs. The same organism was found in 66 per cent. of 346 throat swabs of tuberculous patients and in 58 per cent. of their sputa.

CONCLUSIONS

The conclusions we wish to draw are that haemolytic streptoccoci are carried in a large percentage of the throats and, from the finding of them in washed sputa, deeper in the respiratory tract of tuberculous patients; that it spreads, as is well known, from carrier to non-carrier; and that it is frequently found in the caseous areas and cavities of their lungs, and in various exudates, which are parts of acute inflammations, at autopsies. It, with other acute pyogenic organisms, is probably a factor in cavity formations which were very frequent in these autopsies, for this organism was often found in the caseation which precedes cavitation.

A COMPARISON OF CERTAIN ANTIGENS USED IN COMPLEMENT FIXATION TESTS IN PULMONARY TUBERCULOSIS*

By

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Although it was the non-specific yet highly efficient Wassermann's test that brought complement fixation into general notice, the principle was used even earlier in the attempt to diagnose tuberculosis. It is further interesting to discover that, in these early attempts at the diagnosis of tuberculosis by means of complement fixation its value was considered to be but slight. An examination of the rather extensive literature on this subject which has accumulated year by year since these early experiments reveals two tendencies; first to laud the merits of the test, and second to bring forward new facts in a more critical spirit. For a long time the discrepancies in the findings of the various workers were laid either to their use of different antigens or to different methods employed in the performance of the test. Yet, despite this lack of correlation, but few comparative studies have either substantiated the discrepant findings or paved the way to the adoption of a standard technic.

It was early recognized that bacillary emulsions were in many respects unsuitable as antigens and this led to the use of extracts of various types, the earliest of which was the old tuberculin of Koch. Thus were used watery, alcohol and ether extracts of bacilli, and partial antigens of various kinds[1] each having its period during which it was considered of high efficiency. Besredka[2] described a special antigen which he alone succeeded in preparing and which in the hands of Bronfenbrenner[3] revealed data of some value but had many drawbacks and was finally discarded. Likewise Miller[4] described a bacillary emulsion with which he obtained almost 100 per cent. efficiency but which other investigators failed to corroborate. Petroff[5] describes at least four antigens believing that a higher percentage of efficiency is obtained in using more than one antigen but does not claim the test to be absolutely diagnostic. Recently there appeared another new antigen prepared by Wilson[6] with which Von Wedel[7] claims he can obtain a 100 per cent. efficiency provided he allows the serums to stand a week before testing and uses complement from suitable guinea pigs. Among those workers who have carried on comparative tests within recent years using various antigens on the same serums are especially to be mentioned Lange[8] and Corper and Sweany[9]

* From the Laboratory of the United States Army General Hospital No. 16, New Haven, Conn.

who were unable to find a great deal of difference in the results with the different antigens and who found the efficiency even in definite cases of pulmonary tuberculosis not to exceed 60 to 70 per cent. of positive tests. Among non-tuberculous individuals they obtained positive reactions in from 10 to 20 per cent. of the cases examined. Lewis[10] recently has attempted to refine the technic with a view to increasing the efficiency of the test and finds that in spite of all refinements "the numerical relations are such as to make it unsafe to apply complement deviation to the diagnosis of tuberculosis except as a matter of the most limited confirmatory interest."

The tests to be reported were carried out with a twofold purpose: first to find out whether the Wilson antigen differed in antigenic value from any of the previously described antigens with which a great deal of work had been done, i.e., Corper's and Petroff's; and second whether the contentions of Von Wedel that serums allowed to stand for a week would give more positive reactions and that a high percentage of guinea pig serums were unsuitable for use in complement fixation tests for tuberculosis were correct. It is unnecessary to elaborate on the technic employed in the tests but it might be well to call attention to the fact that the standard Noguchi system was used employing human red corpuscles, human hemolytic amboceptor and guinea pig complement. This system has proven of greater service in testing human serums since it is not complicated by the presence of native amboceptors in the serum such as occurs when the sheep hemolytic system is used usually requiring the removal of native amboceptors before proceeding with the test as was pointed out by Simon.[11] Lack of realization of this fact has led to the first erroneous conclusion by Von Wedel that tuberculous serums allowed to stand for a week give more positives. This is due, as shown in Table I, to the fact that the native sheep amboceptors disappeared upon standing. The serums of 88 clinically positive cases of pulmonary tuberculosis, tested on the first and seventh days using the human hemolytic system, revealed no differences in the results obtained at the different intervals. Using, however, the sheep system, and not saturating out the native amboceptor, resulted in a larger percentage of positives on the seventh day. This change in reaction was especially noted in only the weakly positive reacting serums.

TABLE I

Presence and Effect of Native Sheep Hemolytic Amboceptor in the Serums of Cases of Pulmonary Tuberculosis

Patients	System*	Percentage + 1st Day	Percentage + 7th Day
88	Human	63	62
88	Sheep	48	57

*NOTE: Examination of the serums of 105 patients for the presence of sufficient sheep amboceptor to hemolyse a unit of cells on the first day revealed 51 per cent. while on the seventh day only 2 per cent. still contained a trace of sheep amboceptor.

In order to determine the availability of the general run of guinea pigs for complement suitable for complement fixation tests for tuberculosis and also for syphilis the serums of 75 guinea pigs picked haphazard as they were received from dealers were tested with the results tabulated in Table II.

TABLE II

Available Complement in Guinea Pig Serum

Pigs Examined	Serums Containing 2 Units of Complement	Serums Available For Tuberculosis Tests	Serums Available For Wassermann's
75	70	63	64

These findings, however, do not explain the high percentage findings recorded in cases of pulmonary tuberculosis by Von Wedel and for this reason a further study of the antigen of Wilson seemed desirable.

In preliminary experiments it was found that the Wilson antigen was inferior in antigenic value to both the Corper or Petroff antigen (only the methyl alcohol antigen of Petroff was used in these tests). A number of serums reacting strongly positive with the Corper or Petroff antigens gave only slight reactions with the Wilson antigen. Believing this due to the extraction of soluble products in the preparation of the Wilson antigen, the bacilli used were further extracted with warm absolute ethyl alcohol and petroleum ether, acetone and sulphuric ether when they were found to be practically devoid of antigenic value. The extractives obtained in alcohol proved to be of comparatively high antigenic value, indicating that the Wilson method of preparing tuberculosis antigen really removed substances of value as antigen. In order to determine the relative value of Corper's, Petroff's and Wilson's antigens for tuberculosis complement fixation and also to note the effect of a serum giving a positive Wassermann reaction upon the tuberculosis reaction the cases recorded in Table III were studied.

As a result of the study of these cases using the three antigens it is to be noted that Corper's autolysate antigen (63 per cent. positive in definite cases of pulmonary tuberculosis) and Petroff's methyl alcohol antigen (66 per cent.) gave a slightly higher percentage of positive reactions than Wilson's antigen (57 per cent.). There was also noted a gradual increase in the percentage of positive from 56 per cent. in the incipient cases, 64 per cent. in the moderately advanced and 71 per cent. in the far advanced, while in moribund cases there was a definite drop to 44 per cent. Normal individuals gave positive reactions in 11 per cent. of the cases. A large percentage of Wassermann positive reacting serums (60 per cent. of otherwise normal individuals) gave cross fixation with the three tuberculosis antigens tested.

TABLE III

Results of the Examination of Normal, Tuberculous, and Serologically Luetic Reacting Individuals Using Various Tuberculosis Antigens

Classification		Antigens							Average Percentage Positive
		Corper		Wilson		Petroff*			
		+	−	+	−	+	−	Not Examined	
Normal		11	86	12	85	8	61	28	11
Normal with + Wassermann		13	6	10	9	4	4	11	60
Questionably Tuberculous	without symptoms or rales	7	2	6	3	6	2	1	58
	with symptoms or rales	16	12	16	12	11	13	4	
	with + Wassermann	2	0	2	0	1	0	1	
Incipient	without symptoms or rales	4	7	4	7	1	1	9	56
	with symptoms or rales	47	26	40	33	11	9	53	
	with + Wassermann	12	3	11	4	1	0	14	
Moderately Advanced	Sputum + cases†	33	13	29	17	12	7	27	66
	with symptoms or rales	75	37	65	47	40	15	57	64
	with + Wassermann	16	1	12	5	1	1	15	
Far Advanced	with symptoms	10	4	11	3	10	4		71
	without symptoms	5	2	4	3	5	2		
	moribund	4	6	5	5	5	5		44
Totals on definite cases of pulmonary tuberculosis with negative Wassermann		145	82	129	98	72	36	119	
Percentage positives among tuberculous		63%		57%		66%			

* All of the serums were not tested with Petroff's antigen (the methyl alcohol soluble supplied by the Army Medical School) and therefore a column of the number not examined is included.

† Since all the moderately advanced cases examined had symptoms and rales these figures on the sputum positive cases are included, they being, however, included in the figure under with symptoms and rales which give the total sputum + and − cases but not the Wassermann positive cases.

DISCUSSION

There are innumerable points that might be and have been discussed in complement fixation for tuberculosis; the technic, and especially the antigens. There need be very little discussion of the technic as this has been fully considered by able investigators and all the precautions have been clearly pointed out. It is interesting that the proposal of new antigens has been almost verging on an empirical rather than on a scientific basis; there has been no more justification for the introduction of certain antigens than merely that everything, even sputum, should be tried. Likewise without any conception of the chemistry of the tubercle bacillus, bacillary emulsions have been suggested a number of times, each author claiming added wonders for his antigen which could be nothing but a bacillary emulsion, and why this should have advantages over a simple bacillary emulsion was not comprehensible to trained workers. In this class appears to be the Wilson antigen lauded by Von Wedel. The alcoholic extraction removes both fatty and protein extractives and since this extraction is at best only crude it is natural that antigenic material should remain with the bacilli. Complete extraction, however, as expected removes the entire antigenic substances. It seems that we are arriving at a point in tuberculosis complement fixation tests when a new antigen must have some scientific basis to justify its introduction. A further comparative study of new antigens with some of the standardized older antigens also seems to be a prerequisite for such an introduction. This would obviate, to a great extent, erroneous claims and statements for new antigens.*

SUMMARY

The serums of 97 clinically normal individuals, 37 questionably tuberculous, and 84 incipient, 75 moderately advanced and 31 far advanced cases of pulmonary tuberculosis, using for comparison the autolysate antigen of Corper, the methyl alcohol soluble antigen of Petroff and the Wilson bacillary antigen, gave the following results.

The three antigens did not differ greatly in the percentage positive findings in known cases of pulmonary tuberculosis, Petroff's antigen giving 66 per cent., the autolysate antigen 63 per cent. and Wilson's antigen 57 per cent., the last being the least efficient of the three.

The percentage positive findings obtained in the various classes of cases by the three antigens were 11 per cent. of clinically normal individuals, 58 per cent. of questionably tuberculous, 56 per cent. of incipient, 64 per cent. (66 per cent. sputum positive cases) of moderately advanced, and 71 per cent. of far advanced cases. Moribund cases gave a lower percentage positive, 44 per cent., than any of the definite cases of tuberculosis corroborating the findings by previous reliable investigators.

*Appreciation is due Lieut.-Col. Estes Nichols and the staff of the United States Army General Hospital No. 16 for their kind coöperation. We also thank Major H. J. Corper and Miss M. A. Wilson for supplying their respective antigens for our use in these investigations. The Petroff antigen was obtained from the Army Medical School.

A fairly high percentage of serological positive luetic serums (50 to 60 per cent.) gave cross fixation with the three tuberculosis antigens. The serum of only one out of seven guinea pigs (of a total of 75) obtained on the market proved unsuitable for complement fixation tests for syphilis and tuberculosis corroborating the finding of earlier investigators and not bearing out Von Wedel's contention. The human hemolytic system is superior to the sheep system as ordinarily used in testing serums from cases of pulmonary tuberculosis. The native sheep hemolysins in the serum deteriorate to a great extent in a week.

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SOME PROBLEMS IN COMPLEMENT FIXATION IN TUBERCULOSIS

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Attempts to apply the complement fixation test in the diagnosis of clinical tuberculosis have been made ever since the introduction of Bordet-Gengou phenomenon. This attempt has been revived every now and then, with the result that to-day many investigators are bending every effort to make it applicable as a valuable test in tuberculosis, or to stamp it as an unimportant and unreliable test.

It seems to me that we are working in total darkness. The work done so far has been more or less haphazard. How do we expect to make any progress in this field if we do not study the underlying factors governing this reaction. It is deplorable that so many investigators devote all their time in studying clinical cases and the clinical application of the test, and that so little work has been done by American investigators in the study of reaction itself. We have always taken many things for granted, and anyone who should attempt at the present day to penetrate the mystery which shrouds the numerous problems of complement fixation by reasoning alone would be sure to fall into error.

A brief analysis of the work done so far may be divided, as to results obtained, into three groups, (*a*) those who have a large percentage of positive results like Miller, Craig and Von Wedel, (*b*) those who have obtained extremely low percentages like Corper, Lange, Frazer, and others, and (*c*) those who are between the two groups, having a percentage ranging between 60 and 80. This discrepancy we cannot explain; it may be due either to the lack of the complete and careful study of the cases, or to the error of not observing the minute details controlling and influencing the test.

It has been suggested by many investigators who have studied the theoretical aspect that the reaction is a psycho-chemical phenomenon, that the antigen-antibody complement is an elaborate colloidal system. We have given names to many of the hypothetical substances, such as complement, antigen and antibodies, but as soon as we find the underlying factors, and understand the system better, we are very likely to drop these names. The phenomenon of adsorption unquestionably plays a very important part in the reaction.

It is supposed that when a sensitizer is brought in contact with its homologous antigen a colloidal complex is found. This complex later on adsorbs the complement. The existence of such a complex is indisputable because neither antigen nor sensitizer when used separately in quantity

as used in the test, does adsorb the complement. This complex is governed by several factors, e.g., the concentration, the external and internal phases and the temperature (which is also one of the important factors). The parallelism of this with the behavior of colloids is so close that it strongly supports the view that the reaction is a physico-chemical phenomenon. In order to make this clear let us for a moment discuss separately all the reagents used in the complement fixation.

First, let us take up the antigen, which to me is one of the many important factors in this reaction. There are four groups of antigens, which have been used in the test

(*A*) Tubercle bacilli, dead or living, intact or pulverized, suspended in saline. Antigens of this group are suspensoid, representing therefore a large surface. Such antigens contain lipoids and proteins. It has been proved that heating does not alter the antigenic properties to any extent, and that the enzyms which are present in the tubercle bacilli play no important part in the reaction. With this antigen some of the best results have been obtained.

(*B*) Filtrates of broth cultures of tubercle bacilli, like Besredka's antigen, potato filtrate and old tuberculin. Here again the heating does not alter the antigenic properties of the antigen, because Besredka's antigen and old tuberculin are heated preparations.

The (*C*) group of antigens are represented in Corper's, Massol and Calmett's, Caulfield's, and others, which are ether-alcohol extracts, Petroff's methyl alcohol extract, and Corper's autolytic product, and are either extracts or derivatives of the tubercle bacilli.

The (*D*) group is of minor importance, and embraces those which are extracts of various tuberculous organs.

The above antigens represent groups of varied chemical composition. First they contain a large amount of lipoids; second, lipoids and proteins of the tubercle bacilli in combination, and the third, antigens supposedly free of lipoids.

It does not matter what antigens we use, one rich in lipoids derived from tubercle bacilli, one containing less lipoids, or one which does not contain any lipoids. Recently we have carried on an extensive study to determine the antigenic property of different fractions of tubercle bacilli. Pure lipoid does not give any reaction, while the protein gives us a strong reaction. Positive results, however, have been obtained with all antigens. Probably this means that any antigen representing a proper dispersed phase is a good antigen. As to the question of partial antigen, Bushnell and others believe that they are of minor importance.

Secondly let us discuss the complement; more work and controversy have arisen over the question of the nature and the multiplicity of complements than over any single phase of this reaction. The question of whether the serum of one and the same species contains more than one complement has been in controversy for many years. There are two schools, divided on the multiplicity of complement; one, that of Ehrlich, which has some American followers, and second, that of Bordet. The former believes that there are two complements: one having a strong

affinity for the hemolytic system, and less affinity for the bacteriolytic system, and the second having strong affinity for the bacteriolytic system, and less affinity for the hemolytic system. The latter view is that held by Bordet, who believes that there is only one complement present in the system.

We admit that not every complement is suitable for the reaction in tuberculosis. Wilson has recently pointed out that a pool of guinea pig serum gives the best results, and that every complement must be tried out for its complement binding properties before being used. To us the most important step is the proper titration of complement. A minimal double unit so far has proved the best procedure in our hand. A complement weak in its titre must be discarded. We have found that the maximum titre of .15 cc. or a 10 per cent. complement is the limit of single unit, and for the test .3 cc. of the same complement must be used.

Some years ago we noticed that very often we got results which could not be correlated with some previous finding. Later on we traced this to the salt solution. It was noticed that when freshly distilled water was used we obtained the best results. In the last year we have studied the importance of the saline used. A small experiment was carried on to find the minimal and maximal Ph. concentration of the salt solution. After a series of experiments we came to the conclusion that .85 per cent. salt solution with a 7 or 7.5 Ph. concentration was the most suitable in the test.

The patient's serum, when collected a day or two before the test is done, has proved in our hands to give best results. We have not been able to confirm Von Wedel's statement, which appeared in a recent publication, that the sera when kept in refrigerators for from four to six days give better results, and that sera so kept will give us a positive reaction where fresh sera give a negative result.

Many have attached very little importance to the glassware. Unclean glassware may influence the final results to a great extent. We have found that the best method is rinsing with cold water, boiling with sodium carbonate, rinsing again with water, then passing through 1 per cent. nitric acid, and finally rinsing with water until completely free of acid. This can be determined with phenolsulphophthalein. The pippettes must be treated similarly. These are merely suggestions but they may be of value to some.

It has already been mentioned that antigen and antibodies, when brought in contact, yield a colloidal complex. The quantity of antibodies present in a serum which can form a complex with the antigen depends upon their concentration. A serum with a weak titre of antibodies very often fails to give a stronger reaction when twice or three times the quantity of serum is used in the test; in other words the greater the concentration of the antibodies is, the stronger the complex with the antigen is.

The temperature, as stated, is of no little moment. Antigen and antibodies, being colloids, and corresponding very closely to many hydrophilic colloids, in behavior to heat sensitiveness, have a definite

temperature point, which lies between 35° and 40° C., for at such a degree the complete complex takes place. If we take a definite amount of patients' sera with a definite amount of antigen and incubate this at different temperatures ranging from 8° C. to 56° C. and then add complement we find that as the temperature increases the reaction becomes stronger until the optimum temperature is reached, which is 35° C. to 40° C., and from that point on as the temperature increases the strength of the reaction decreases.

Bordet noticed that a serum, when brought together with an homologous antigen at 37° C. agglutinated, but such an agglutination after the temperature was increased to 50° C. was completely disagglutinated. This phenomenon is common to many colloids as shown by Lansteiner and his collaborators.

Is the complement fixation in tuberculosis specific? Many investigators in this field say no, because many cases with other diseases, and also because many so-called healthy individuals give periodically positive reactions. Has any one up to the present been able to prepare any antigen by taking any protein, lipoid or lipoprotein derived from other sources than tubercle bacilli, and use them successfully in complement fixation in tuberculosis as an antigen? We have been engaged for several years in search of such substances to take the place of tubercle bacilli, but so far we have failed to find one. If such remains the case then we must admit that tubercle bacilli, filtrates of their cultures, or the products of such cultures are necessary as an antigen. We have discussed the physicochemical aspect of this reaction, and in spite of all this we must admit at present that there is a certain amount of specificity in this reaction. Many consider Wassermann's reaction as specific and of greater value than complement fixation in tuberculosis, but we know how Kolmer obtained positive Wassermann reactions with serum of a rabbit which had previously been inoculated with lecithin. This is not the case with the complement fixation in tuberculosis, positive fixation has been obtained only when we have a tuberculosis lesion or the disease tuberculosis.

Some few years ago we obtained a positive Wassermann reaction with the blood of a cow having tuberculosis, and demonstrated this very often. The same thing also was observed with the serum of a sheep which was infected with human tubercle bacilli. Neither of these animals had lues. Recently the cow was killed and the autopsy showed extensive tuberculosis. Such a non-specific complement fixation reaction, using tubercle bacilli or their derivatives as antigens, has not been demonstrated when a normal animal was used. All experimental data at hand, obtained from healthy and tuberculous sheep, cows, rabbits and guinea pigs, point to the fact that a positive complement fixation is present only where the disease tuberculosis is present, and that the test is negative with healthy animals.

Such a conclusion, drawn from experimental data, must point out that when a positive reaction is obtained from a human serum, very likely it means that tuberculosis is present.

The positive complement fixation does not mean only pulmonary

tuberculosis. Any tuberculosis focus produced by tubercle bacilli or a product of tubercle bacilli (antigen) is going to give us antibodies. These antibodies may be of great or low concentration and a positive reaction is the result.

We have never claimed that an absolute diagnosis of clinical tuberculosis could be made by complement fixation alone. We have stated in some former publication that the value of the test lies, as with all laboratory tests, in giving aid to the clinician. This test is merely evidence, which the clinician must weigh in connection with other evidence in making his diagnosis. If he suspects that a case is one of early tuberculosis, with suspicious x-ray evidence, a positive complement fixation test will be of some value in advising the patient.

What does a negative reaction mean? It means first, absence of complement fixing antibodies, or lack of antibodies with excess of antigen or some other substances acting as anti-sensitizers. In the latter case we may advance a working hypothesis that very likely the antibodies concerned are produced in the patient in question, but the effect of a positive reaction was masked, or reduced to negative on account of some inhibitory substance. It was stated elsewhere that electrolytes play a very important part in the colloidal complex. Some electrolytes inhibit the action of others.

Take for instance calcium chloride, which as you know decreases the time of coagulation of the blood, while sodium citrate acts diametrically opposite. As there are so many substances present in the blood serum besides the antibodies it is no wonder that we get a faulty reaction. If there is some method by which we could separate antibodies from the serum, such an extract free from foreign substances will, without doubt, give us the most perfect and reliable results.

We have made attempt after attempt to separate the antibodies from the serum, but the results have been negative. Antibodies are precipitated by alcohol, and are carried down with the protein precipitates. It is very likely that they are not part of the serum protein, but are adsorbed by protein particles.

We are reluctant to advance an opinion that the test gives us any information as to the activity or the arrest of a case. The question of activity will always arouse debate. The opinion of practically every clinician differs in the determination of clinical activity, as the standard of activity is not the same. The work on complement fixation done in the army cannot be compared with our results, reported in former publications, because there is marked difference between the standard used in the army and that used by us. The same is true with the work of many other sanatoriums or individual workers.

THE TYPES OF TUBERCULOUS LESIONS FOUND AT AUTOPSY IN A MILITARY HOSPITAL*

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THE work of overseas pathologists on tuberculosis and reports by Webb of the finding of rather acute clinical types of the disease lead me to attempt the classification of a series of autopsies done in this country on soldiers dying of tuberculosis. This series of 112 consecutive autopsies is made up of cases from various camps in the United States (54 cases) and of men returned from France (58 cases). The autopsies were performed by a number of pathologists during a period of one year. Forty-seven cases are reported from the United States Army General Hospital No. 21, Denver, Colorado, and 65 from the United States Army General Hospital No. 16, New Haven, Conn. The work has been checked by microscopical sections and the bacteriology has been carefully worked out in most instances. Antemortem and postmortem x-ray plates have proved quite an aid to the pathologist in bringing out clearly certain points, such as the presence of a pneumothorax. Whenever possible we found it very helpful to make cultures from each lung and the heart blood by means of syringes the night before the postmortem so that the presence of secondary organisms, especially the streptococcus hemolyticus, would be known before the autopsy.

We shall endeavor to group the cases under the large headings, acute primary tuberculosis, sub-acute secondary tuberculosis and the chronic form. There were also a few cases of a non-tuberculous nature. In many instances accidents, such as spontaneous pneumothorax, secondary or terminal infections with hemolytic streptococci, pneumcocci, and diphtheria bacilli and miliary tuberculosis have hastened the course of the disease. Before describing the types in detail we will give a general idea of the class of cases which came to autopsy. The usual history was that of the onset of chills, fever, cough and malaise, sometimes acutely, at other times gradually, in a man who had had practically none of the usual camp diseases (84 of 112 had no camp diseases up to the time of onset). Seven cases reported had been gassed. Six had had influenza. The average length of life after the development of the first symptoms was six and one half months; the shortest time being two months in a man dying of miliary tuberculosis; the longest being sixteen months in a chronic case. Of 31 Negroes in the series ten came from northern states and 21 from southern. The northern and southern Negro react to the

* From the Laboratories of the United States Army General Hospital No. 16, New Haven, Conn., and No. 21, Denver, Colo.

tubercle bacillus in the same way. Fourteen non-tuberculous cases came to autopsy.

ACUTE PRIMARY TUBERCULOSIS

Deycke has described a type of acute tuberculosis found in Turkey in which the serous surfaces are mainly involved in an acute tuberculous process. We have one such case to report.

J. W., colored, age 27, born and lived in a small town in Texas, was overseas eight months. Five months before death he noticed pain in the chest, a non-productive cough and dyspnoea. Later he had abdominal pain. At autopsy was found fibro-caseous tuberculosis of both pleurae of both serous surfaces of the diaphragm, of the pericardium and of the peritoneum; extension of the process into the liver and spleen. Caseous tuberculosis of the mediastinal and abdominal lymph-nodes.

SUB-ACUTE SECONDARY TUBERCULOSIS

One is tempted upon first examination to consider the large caseous lungs seen at autopsy as due to acute tuberculosis and not to analyze the lesions to see if it is a wild-fire primary spread of the disease. If careful sections through several planes, especially posteriorly and below the apex, are made they will show what is presumably the starting-point of the acute process, namely an old walled-off tuberculous focus.

In the cases under consideration those showing these massive consolidations or unrestricted studdings of the lungs, with practically no macroscopical evidence of fibrosis, have been called sub-acute. Generally the trachea, larynx, and intestines are involved in these cases. The lymph-glands, especially in the Negro, are nearly all tuberculous. Tuberculosis in the Negro generally comes under the sub-acute type. Once seen it is remarkable how uniform the lung picture is,—large pulmonary communicating cavities with soft, macerated, moist, ragged walls, tuberculosis of the lymph nodes, especially the mesenteric, which form large grape-like clusters, large nodular tubercules in the spleen and liver, and ragged hypertrophic ulcerations of the intestines, make up the picture.

CHRONIC TUBERCULOSIS

MacCallum's description of the picture found in chronic tuberculosis is briefly this, "a cavity at the apex opening widely into the bronchus and surrounded by consolidated fibrous lung tissue studded with caseous foci, and, below this, numerous patches of pneumonic consolidation, varying in age from the freshest to the completely caseous area, walled round by organized exudate and tuberculous granulation tissue." In addition to this we would call attention to the extensive involvement often found in the lower anterior part of the left upper lobe and to the band-like distribution of the more recent tubercles found in the lower lobes in chronic tuberculosis. In no case did we find amyloidosis. Sixty-one of 95 cases show tuberculous ulcers in the intestines. Attention must be called to the regular intervals at which ulcers occur, and in some instances we thought we could demonstrate an enlarged mesenteric gland in direct

relation with the ulcer. The question arises why these ulcerations should be found at definite intervals if they are due to swallowed sputum.

A summary of the chief pathological changes observed in the principle types of cases are given in Table I.

TABLE I

Summary of Chief Pathological Findings in the Principal Types of Cases

	Sub-Acute	Chronic
Cavity left apex with dissemination	1	22
Cavity right apex with dissemination	8	15
Cavities both lungs with extensive caseation	8	10
Cavities, both lungs: peribronchial or morulate type of dissemination	1	19
Tuberculosis and terminal streptococcus infection	3	9
Tuberculosis and terminal pneumococcus infection	4	2
Tuberculosis and terminal diphtheria	0	3
Tuberculosis and terminal staphylococcus aureus infection	0	1

ACCIDENTS

Accidents terminating the disease have been frequent in this series, one of the most striking being spontaneous pneumothorax. A manometer, a tight fitting luer syringe, or merely pouring water between the skin and chest wall readily demonstrated air under pressure in the chest. At the United States Army General Hospital No. 16 at New Haven, the incidence was 14 cases out of 15 autopsies. In the Denver series there were 4 pneumothoraces in 47 cases. Strange to say the clinical cases now on the wards at the two hospitals seem nearly in the same proportion. The incidence of involvement of the right or left side was about the same in both series. The number of perforations varied from one to three and the size of the hole varied from a millimeter to a centimeter. In four cases hemolytic streptococci were found in the lung cavity, through the wall of which the perforation had occurred. It is possible that the streptococcus, rather than the tubercle bacillus was responsible for the softening and rupture in these cases.

Terminal hemorrhage occurred in three cases of 112.

Miliary tuberculosis was found in four cases; three of these were in white men, and one in a Negro.

The streptococcus hemolyticus, type not determined, was found in twelve cases. Two were found in the series at United States Army General Hospital No. 16 and ten in the series at United States Army General Hospital No. 21. The "cream-tomato-soup" character of the fluid in the streptococcus cases which is found in the almost necrotic soft tuberculous cavities seems almost diagnostic. Cultures must be made from the cavities and pleural exudate which is present or the organisms will be missed. Apparently they remain localized to the respiratory tract.

TERMINAL DIPHTHERITIC INFECTIONS

From time to time suspicious bacilli of the diphtheroid group have been found at the United States Army General Hospital at Denver. Several surveys were made and the carriers isolated. Later on Klebs-Loeffler bacilli were found in three cases of far-advanced pulmonary tuberculosis in the infirmary wards who had membranes just visible on the fauces. Those men were given large doses of antitoxin but the membranes persisted and death followed. Several ambulatory patients with typical diphtheritic patches on the tonsils cleared up over night after the administration of ten thousand units of diphtheria antitoxin. Frequent surveys of the infirmary patients and of their attendants is the best way to protect these far-advanced cases from diphtheria.

THE NON-TUBERCULOUS CASES

The series in the United States Army General Hospital No. 16 at New Haven revealed ten influenza cases while there were none at the United States Army General Hospital No. 21 at Denver. In the Denver series are reported one case each of lung gangrene, lung abscess, sub-acute endocarditis, streptococcus pneumonia, and sarcoma of lymph glands. Ten of the 16 non-tuberculous cases showed obsolete tubercles. The search for old healed tubercles is time consuming and is not always noted on the records. A printed form to be checked off at the time of autopsy solves this problem.

SUMMARY

1. A case of acute primary tuberculosis is reported in this series of 112 autopsies.

2. The majority of the cases of the series fall under the heading of sub-acute tuberculosis in point of time since the first symptoms, and in the character and spread of the disease.

3. Accidents occurring during the course of the disease were fairly common. The cases from United States Army General Hospital No. 16 revealed frequent incidences of spontaneous pneumothorax, while those at United States Army General Hospital No. 21 revealed terminal secondary infections.

4. Healed tuberculous lesions were found in ten of the 16 non-tuberculous cases included in this series.

I wish to thank the Commanding Officers of United States Army General Hospitals No. 16 and No. 21, and especially Major H. J. Corper and Lieutenant J. P. Givler for permitting me to use valuable records and photographs and for aid in preparing this paper.

AN INTERESTING CASE OF FOREIGN BODY IN THE BRONCHUS RECOVERED AT POST-MORTEM

By JAMES B. DINNAN, M.D.
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A foreign body in the larynx, trachea or bronchus occurs frequently as the result of accident. In the most cases it is some article that had been held in the mouth and aspirated into the air passages by a spasmodic inspiration, the result of an unexpected fit of coughing or laughing. In some cases articles of food may be aspirated by a faulty act of swallowing. These accidents may happen when the victim is in full possession of his faculties, but they occasionally happen during intoxication from alcohol, or during general anesthesia. The effects produced by the inspiration of such bodies depend upon such factors as the size and shape of the offending article, the condition of its surface, and its place of lodgement. Large angular and rough bodies are most frequently arrested in the larynx while pointed substances, pins, toothpicks or sharp bones or smaller, smoother bodies may pass on to the trachea or bronchi. When arrested in the larynx, they usually produce violent coughing spasms, dyspnoea and sometimes suffocation. If the object passes on to a bronchus, it may occlude it, and cause an atelectasis the amount of which depends upon the size of the bronchus involved, and its distribution, while if the article is small and does not entirely impede the ingress and egress of air it may remain for a considerable period of time without serious symptoms. Ordinarily the presence of a foreign body in the air passages is a source of danger to life. Broncho-pneumonia, edema of the lungs, chronic bronchitis, asthma, chronic lung infections and even pleurisy and tuberculosis have been reported to have actually arisen secondarily as the result of foreign bodies. The literature on the subject of foreign bodies in the air passages would seem to show that almost every article that could be placed in the mouth has been reported: tacks, nails, pins, coins, small metal articles, parts of toys, jack stones, staples, collar buttons, rings, lockets, needles, bones, toothpicks, nuts, seeds, shoe buttons, pebbles, pieces of china ware, natural and artificial teeth and many others have been reported as the offending bodies. I have not, however, been able to find a case similar to the one I now wish to report: This is one in which a clinical thermometer was accidently aspirated and recovered eleven months later at postmortem.

The victim, R. K., 60 years of age, had been a patient at the Meriden Sanatorium for three years suffering from pulmonary tuberculosis that involved the entire right lung and the upper lobe of the left. His sputum contained tubercle bacilli. In addition to his tuberculous condition the right side of his body was paralyzed and his speech thick and difficult.

This hemi-plegia he had had for two years before his admission to the sanatorium. His general condition was fair but he had to lie flat in bed.

On February 14, 1918, the nurse who was taking 8 p. m. temperatures had given this patient a thermometer, in fact had placed it in his mouth. She had counted his pulse and respiration, and had turned away from the patient to answer some question. She turned again toward the patient just in time to see the end of the thermometer disappearing down his throat. She became alarmed, and I was immediately called. I found the patient unexcited and not apparently concerned in the least. There were no coughing spells, and no sign of distress of any kind, in fact at the time I doubted that any such accident could have occurred without causing more disturbance of the patient. I conducted a search of the bed clothing and the vicinity of the patient, thinking that he might have broken his thermometer and attempted to hide the parts. I was unable to find any trace of it, and of course concluded that he had swallowed it. His stools were watched for several days. Still no trace of the thermometer. About ten days after the accident the patient was taken with a violent paroxysm of coughing lasting several minutes. He became cyanosed and was in considerable distress. After this paroxysm he quickly regained his composure, but in about two weeks he had another similar attack. These attacks occurred regularly thereafter at about two weeks' intervals until about two months before he died, when they became much more frequent. During the last period, he had one or two attacks a day. Examination of his chest showed impairment of resonance over both lungs, rough broncho-vesicular breathing over both, and crepitant rales throughout entire chest. These signs did not change during the period following the accident. Our patient died January 17, 1919, about eleven months after accident. We felt sure that the thermometer had found lodgement somewhere in his lungs but had been unable to tell in which.

Owing to the fact that the sanatorium was not equipped with x-ray apparatus and that the patient was bed-ridden and unable of transportation to a place where a radiograph could be taken we were unable unfortunately to have a plate taken during life. After considerable trouble and delay permission for autopsy was obtained and was performed two days after death. Upon opening chest we found the right lung firmly bound with adhesions over entire surface and it was difficult to remove. The apex of the left lung was also firmly adherent. The trachea from the larynx, and the lungs were removed entire. The right lung was firm, dark, and congested while the left was somewhat emphysematous and much lighter in color. Palation of the lungs failed to place our missing object. The trachea was opened down to the bifurcation of the bronchi. No result. The probe was passed into the bronchi without result. Finally by opening down the bronchi in the right lung we found our thermometer firmly held in a small bronchus in the lower lobe of the right lung. The thermometer was not removed and through the courtesy of Dr. Lyman of Gaylord Farm I was able to get a plate of the lungs with the thermometer still embedded, which plate I show you to-day.

COMPARISONS OF STEREOROENTGENOGRAMS OF THE CHEST WITH AUTOPSY FINDINGS AT U. S. A. GENERAL HOSPITAL NO. 19, OTEEN, N. C.

By

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AND

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This is a review of a comparison of stereoroentgenograms with the pathology found in 46 autopsies at this tuberculosis hospital. These cases were the only ones on which stereograms were taken on patients who later were autopsied by the junior author, and they are selected from the first 2000 cases and from 76 autopsies. No attempt is made at this time to give a complete or statistical analysis of the work, but a few of the striking findings are presented for consideration.

The x-rayist has attempted to diagnose lesions, whether they are active or negative, cavities, caseous-broncho-pneumonia, pleural thickening and effusion, to locate lesions within the lobes, and to give a prognosis. An examination of stereoroentgenograms of the case is very valuable before opening the thorax at autopsy. We have always done this and have also demonstrated the plates at the autopsy table. As an example of the usefulness of this procedure, the pathologist recently would probably have overlooked a small cavity in a lower lobe, which was remarkably healthy, had he not been prompted to look for it by reading the plates. We save practically all the slightly involved lungs for inflation and x-ray, and later together study the fixed lung beside the stereoscope. The lungs are sectioned thoroughly along the bronchial trunks and the study of densities and pathology, gross and microscopic, has been very instructive and interesting. At the autopsy table also, similar sections are much better for demonstrating the pathology than the ordinary longitudinal incisions, which are better for obtaining museum specimens. We cannot say too much of the value to both the x-rayist and the pathologist of this teamwork. It shows that by systematic effort we can constantly improve our knowledge of pathological densities and more accurately translate them into cellular pathology.

The diagnosis of the general lung conditions has been remarkably correct beyond expectation. A diagnosis of active pulmonary tuberculosis was made correctly 38 times. Diagnosis was not made three times. All

of these latter were unusual cases of thick caseous pleurisy of which we have found ten in our autopsies, and five of these have been included in this series and they will be considered later in greater detail. We wish to stress one case diagnosed as not showing any tuberculosis which was confirmed. This was a case of advanced Laennec's cirrhosis of the liver with ascites. There were three cases in which the x-rayist gave a diagnosis of activity undetermined. In one of these there was a very extensive caseous tuberculous pericarditis and there was marked pulmonary tuberculosis with red hepatization in one lobe and 400 cc. of fluid in the right pleural cavity. In Autopsy 61 a provisional diagnosis of activity was made, but the lung showed great tuberculous involvement with cavitation. The x-ray was taken 13 weeks before autopsy. Autopsy 66, in which the activity was undetermined, showed a thick caseous pleura and a little caseous broncho-pneumonia in both lungs.

CAVITIES, CASEOUS BRONCHO-PNEUMONIA AND ANNULAR SHADOWS

In no case was caseous broncho-pneumonia or cavitation diagnosed by the x-ray which was not found to be present and in the lobes indicated, but they were very much increased in size and number at autopsy. The future situation for the x-rayist is much more hopeful in diagnosing caseous broncho-pneumonia because at each autopsy we learn a little more of this characteristic density, and this is particularly the case in a comparison of postmortem stereograms of the inflated lung with the fixed specimen.

It has often been very difficult to distinguish, in the gross, gray exudative processes of acute secondary pneumonias from the exudative tuberculous reaction which accompanies caseous broncho-pneumonia, but an examination for acute organisms stained in the tissues should later be helpful. They are a common finding in cultures of such areas.

In our more recent cases the diagnosis of broncho-pneumonia has more closely fitted the postmortem findings. This is not the case with cavity, because when it lies in an area of great consolidation, especially when filled with débris, its characteristic density is not recorded upon the plate. It will, therefore, always be found in these rapidly progressing cases, such as most of ours have been, that many more cavities will be found at autopsy than the plate can show. Certainly, when readable stereoroentgenograms can be taken at the bedside just before autopsy, the x-rayist will make a better showing in such a comparison as we are giving. In this series an average of ten weeks elapsed between the taking of the plates and the autopsy. In 33 of these cases cavities were diagnosed and located and were found by the autopsyist, but the latter found cavities in 39 cases, and as mentioned before, much more increased in size and number. In one case, in which a pneumothorax, localized at the left apex, was diagnosed, a very large thin-walled cavity, replacing almost the entire lobe, was found. Twice annular densities were noted by the x-ray. In Autopsy 17 the report reads: "A heavy circle of increased density, left upper lobe." This was a large circular area of thickened attached pleura

overlying a pyramid of caseation in the lung in which a cavity was found. In Autopsy 72, performed May 22, a large cavity was found at the apex of the left lower lobe; on February 17, this was called an annular shadow which in the plate on March 20 had almost dispersed. This cavity did not have the thick pleura or the caseous wall of the previous case, and it impinged on the slightly thickened pleura between the lobes and on the pleural sac. Nothing was found in the interlobar fissure.

CASEOUS PLEURISY

One of the most interesting features was a relatively large number of caseous pleurisies, found ten times in these 76 autopsies and five of these are included in this report. A specific diagnosis was not made by the x-rayist in any of these, but thickening of the pleura was recorded. Several of these were thought to be pleural effusions or empyema with organization of thickened pleura. On account of the interest excited by a recent paper by Deycke on "Epidemiological Observations on the Occurrence of Tuberculosis in Turkey" and by a recent series of lectures by Colonel Bushnell, these cases are considered of sufficient interest to present them in more detail. Seven of them occurred in Negroes, three in white men. The condition was bilateral four times, and the one showing the most extensive caseation measured on the average 5 cm. at apex and base and extended over the entire left lung. The average thickness in all cases was a little over 1 cm. One of the remarkable features was the presence of fluid in the pleural cavities noted nine times, of which two were empyemas and two were encysted interlobar hydrothoraces. The liver presented caseous tubercles, not of the miliary type, in three and there was caseous perihepatitis in three and perisplenitis in two; extensive caseous peritonitis was noted in two cases. The mesenteric glands were large and caseous in seven, three of which are of particular interest, from the finding of large caseous glands in the gastro-hepatic omentum near the head of the pancreas. In only two of the cases, in which the peritracheal glands were noted to be caseous, were the latter large. In four, the lungs were involved in extensive tuberculosis and, in five others, the tuberculosis seemed to enter the lung by extension from the pleura. Tuberculous ulcers of the bowel were found in six cases. The extreme limits of age in these soldiers were 22 and 30 years and the average 24.5 years.

FIBROUS PLEURA

Fibrous pleura, usually bilateral, and of various thicknesses was found in practically all cases and except for a number of times when it was diagnosed by the x-rayist as lying between the lobes, or as pulling the diaphragm up, or in the massive densities of the caseous pleurisies, the x-ray was unable to diagnose the condition.

FANS

In seven cases, one or more fans of various densities were diagnosed

by the x-ray and these were corroborated but, as with the case of caseous broncho-pneumonia, these were found more often at autopsy. In 13 cases the autopsyist has noted fans in his protocol which were not mentioned by the x-rayist.

PLEURAL EFFUSION

The number of times in which pleural effusion or empyema was found at autopsy was surprising. From our frequent finding of streptococcus haemolyticus and from the microscopic picture of the exudative process in many of the lungs, which is very often a typical interstitial pneumonia reaction with wide infiltrated interlobular septa, this frequent finding of pleural effusion may not be so surprising, for the lymph flow in the peripheral few centimeters of the lung is outward toward the pleura. We are practically always able to isolate a pyogenic organism, most frequently streptococcus haemolyticus, from these fluids. In 76 autopsies, 20 showed a sero-fibrinous pleurisy and eight empyemas, and in connection with the latter it must be remembered that a few of these cases died of acute infection. In this series of 45 cases, fluid was found in the pleural cavity 21 times. Of these the x-rayist diagnosed two, and made a positive diagnosis five times when no fluid was found at autopsy. Of the latter, four showed the caseous pleurisy mentioned before, and the other, which was diagnosed as "old pleural effusion, organized in part," presented, five months later, organized fibrin on the lung but no effusion. In the cases of the effusions not seen on x-ray plate, these were taken on an average ten weeks before death. The fluid was in small amount in eight cases.

Several cases deserve special mention. In Autopsy 17, January 15, 1919, in which plates were obtained on November 30, 1918, there was a large caseous pericarditis in which the tubercles were infiltrating the heart muscle. The x-rayist thought that the enormous increase of heart density might be due to a pericardial effusion. This was the case of annular density which was due to fibrosis and caseation around a cavity. In addition there were caseous perisplenitis and perihepatitis, tuberculosis of liver and spleen, larynx, and bowel, infarct of kidney and sero-purulent pluerisy. There was also caseous broncho-pneumonia of both lungs. Autopsy 45 was performed March 29, 1919, and is of interest because of a left-sided spontaneous pneumothorax which was not present in the stereoroentgenograms of November 22, 1918, but was seen on a single bedside plate taken the day before autopsy. On February 12, 1300 cc. of sterile serous fluid were withdrawn from this side and 850 cc. on March 27. Autopsy confirmed the extensive pulmonary tuberculosis and the pneumothorax, and in addition there was an empyema on the left, and tuberculous laryngitis and enteritis. Autopsy 61 was performed April 30, 1919, and the plates were taken January 21 when there were read "great thickening of pleura on the right side; a heavy band of increased density extending between the upper and the middle right lobes, a general mottling throughout the lung above and below this density, and a cavity above this in the upper lobe." The diagnosis was not positively made

for tuberculosis. At that time the clinician considered him active and he was not very sick. The autopsy nine weeks later showed active, ulcerative tuberculosis in the right upper and middle and the lower left lobes and caseous broncho-pneumonia throughout. The cavities, except one in the right upper lobe, were quite small and pus could be expressed from the lung in many places. The density was due to a heavy scar at the junction of the three right lobes. Autopsy 70 was interesting from the pathologist's view-point. The active pulmonary tuberculosis diagnosed at x-ray was confirmed. The man died of staphylococcus aureus septicaemia and there were two large recent vegetations on the tricuspid valve from which the same organism was grown. He had been operated on for tuberculosis of the sternum on March 24 and the wound was dry at autopsy, which was performed May 19.

PROGNOSIS

The x-rayist has attempted to give a prognosis from the plates alone when possible. It was an experiment. The reason this was attempted was because the x-rayist thought that he could frequently tell the pathological lesion within the chest. If correct we should then be able, in many cases, to translate this knowledge into the expected course of the disease. Thus, given a diagnosis, the degree of activity, and the amount of lung destroyed, we should at least try to see what could be accomplished in foretelling the fate of the case.

Certainly we have not done so well as with diagnosis, and this will not be a complete report upon prognosis until we have taken all cases and see how many "grave" prognoses have recovered. We believe that it is worth while to report what we have done in cases whose fate in this world is sealed. We have gone far with this study and know that it has great value. It must be understood that a broad knowledge of tuberculosis is necessary, that a prognosis cannot be made with only a knowledge of roentgenology. The details of the prognosis of this series of fatal cases are as follows: A prognosis of "desperate" was made 23 times, of "extremely grave," "grave" and "probably grave" 12 times, and of "good" or "not made" ten times. Of the latter, a stereoroentgenogram in A–15 was taken on October 29, but a single plate taken at bedside on December 29 led to a prognosis of "desperate" and the autopsy on January 9 revealed extensive tuberculous pneumonia with cavitations and acute secondary pneumonia; A–17 was the case of tuberculous pericarditis; A–35 showed cirrhosis of the liver; A–12 showed extensive pulmonary and generalized tuberculosis and meningitis; A–59, prognosed "good so far as the lungs were concerned," showed only two small fibrosing caseous tubercles in the left apex and extensive tuberculous peritonitis; in A–61, while a cavity and general mottling were read on the plates, the pulmonary tuberculosis was extensive, the autopsy being three months after x-ray; A–69 and A–66 and A–41 showed caseous pleurisy and A–70 died of staphylococcus septicemia and acute endocarditis.

SUMMARY

In this comparison of autopsy findings of 46 cases with the stereoroentgenograms, taken on an average ten weeks before death, cavities, densities of a caseous broncho-pneumonia, and fans which are recorded on the x-ray record, have all been confirmed at autopsy, but in all the cases of pulmonary tuberculosis the extension has been remarkably rapid and great. Thickened fibrous pleura usually escapes detection by the x-ray unless it is between lobes, has deformed the diaphragm, or is sufficiently irregular in its distribution to produce abnormal densities along the lateral wall. Thick caseous pleurisy has always escaped detection by the x-rayist and pleural effusion seems to be quite common in the rapid extension of the tuberculous process in the last few weeks.

The general lung diagnoses were remarkably correct beyond expectation. The result of this careful collaboration between x-rayist and pathologist has shown that the stereoscopic readings of lung plates, as introduced by the senior author[1] some years since, give more nearly the exact pathological condition of the lungs while the patient is living than all other means previously devised. Also that routine stereoscopic plates, read with especial attention to the trunks, are essential to complete a chest examination; that a study of such plates by the pathologist before cutting will greatly assist in the postmortem examination of the lung.

CONCLUSION

In conclusion we wish to emphasize the following points:

1. The great value of team work between the x-rayist and the autopsyist, in particular the comparison of stereoroentgenograms of the removed inflated lungs with the fixed specimen later.
2. The absolute necessity for stereoroentgenograms in pulmonary tuberculosis.
3. The rapid spread of caseous processes with extension of cavitation in these young soldiers.
4. The prevalence in the gross of secondarily infected pneumonitis and pleurisy and the frequency of the haemolytic streptococcus*.
5. The frequency of caseous pleurisy, in Negroes especially.

* See article "Streptococcus Haemolyticus in Tuberculous Lungs," by Lieut. J. N. Hayes in Transactions of National Tuberculosis Association, 1919.

[1] Stereoclinic "Chest," Kennon Dunham, Southworth and Co., Troy, N. Y.

Note.—The following papers presented before the Pathological Section will appear when completed in THE AMERICAN REVIEW OF TUBERCULOSIS:

"Experimental Studies on the Migration of Tubercle Bacilli in the Guinea Pig Body," by Allen K. Krause, M.D.

"The Changes in the Intra-pulmonary Lymphoid Tissue of the Rabbit's Lung, Induced by the Intravenous Inoculation of Acid Fast Bacilli," by Allen K. Krause, M.D.

"The Immediate Localization of Tubercle Bacilli in the Rabbit's Lung After Intravenous Inoculation" by Allen K. Krause, M.D., William S. Miller, M.D., and Alva B. Craddock, M.D.

SOCIOLOGICAL SECTION

Chairman

ERNEST D. EASTON

NEWARK, N. J.

Secretary

EDWARD HOCHHAUSER

NEW YORK

SOCIOLOGICAL SECTION

FIRST SESSION

WHAT HAS MORE CENTRALIZED CONTROL TO OFFER IN SOLVING THE TUBERCULOSIS PROBLEM?

The Chairman: We have a most interesting discussion this morning upon "What Has More Centralized Control to Offer in Solving the Tuberculosis Problem?" The policy of the anti-tuberculosis societies all over the country in the past has been first to create an interest in various forms of tuberculosis work demonstrating their need and value and then to ask the public authorities to take them over. In other words, we are the pioneers, creating a demand and then inducing, persuading and coaxing public authorities to do what we conceive to be their duty. Some time ago Dr. Pryor of Buffalo told us that our duty in regard to the tuberculous was to take care of them at the right time, and at the right place, until they were either dead or well. In this way we might save the sick and prevent further infection among the well. We conceived it as a part of our duty to build tuberculosis hospitals or sanatoria, and the private societies have devoted a great deal of energy, time and money in developing and stimulating an interest in county, state, and other kinds of hospitals or sanatoria. We are glad to report that many hospitals have been built within the last ten or fifteen years as a result of our crusade. Not everything, however, has been done that should be done. We have, in many instances, induced boards of health that have never done tuberculosis work before to take up such work as the starting of tuberculosis dispensaries and the employment of tuberculosis nurses. Open air schools have often been equipped by the private societies, and later taken over by the boards of education. Thousands of such schools are now being operated in the United States, almost wholly under the direction of boards of education.

As the work of the tuberculosis society is gradually taken over some of these public authorities are beginning to feel that the function of the private society has ceased to exist and there is no longer any need of it. They are privately and sometimes publicly intimating that we had better go out of existence. They admit that we have done some very good work, that through us these various activities have been started, but they do not see any need for the private society existing to stimulate their own activities.

I must say that I feel that this is shortsighted on their part, because a great many of the public agencies welcome the private society in order that they may get a larger support. I know of a few, however, that want

to get rid of the private society in order that they may have complete control of the entire situation.

Some of us have felt that perhaps now is a good time to permit some of the public agencies to say just how far they can go in the control of tuberculosis. Last year at the time of the influenza epidemic we saw how futile some of their efforts had been and we realized that local communities very often failed in the control of tuberculosis. In some communities where the population was mostly foreign born, where there were very few of the native born people to create the proper sentiment for public health legislation, and public health education, and where very little educational work was being done, the public were suffering because of it. The foreign born element was unwilling to appropriate enough money to support an adequate board of health. In the State of New Jersey we fell down in several instances when the State Board of Health tried to step in and control the influenza situation. The local authorities said that this was their function, that this was a democratic government and that it was their function to control the health of their own community. It did not seem to matter whether the entire community was taken away by tuberculosis, or some other kind of disease; it was their power to control that disease. We tried to get a law passed, giving the State Board of Health power to step in and assist local communities where it seemed necessary. Unfortunately the bill did not pass, so that we are still at the mercy of a democratic form of government in our health control.

Personally, I want to express my gratitude to the United States Public Health Service for what it did in a voluntary capacity in the State of New Jersey. In a friendly way it practically took control of many situations where local boards or the State Board of Health were unable to handle them. Some of us felt that perhaps if the State Boards of Health were unable to control the situation, we could appeal to the Federal authorities, and that they could find a way to cover the entire situation. It was with these thoughts in mind that we arranged the program for this morning and we want to hear from the various public authorities and have them tell us just what they would do if given complete opportunity in the control of tuberculosis.

The first speaker has been engaged in public health work for a great many years. Until the last year or so he has been in the State of Washington, and if I am not mistaken he had something to do with the control of the bubonic plague in Seattle. He has been unselfish in his devotion to all kinds of public health work. He is now with the United States Public Health Service as chief of the Hygienic Laboratories in Washington, and I take great pleasure in introducing Dr. B. J. Lloyd, Surgeon of the United States Public Health Service.

Dr. B. J. Lloyd, Washington: Before proceeding with my paper let me say that I hope there are not many of you who feel that government agents are not accommodating or that they are trying to usurp others' duties or prerogatives, or, at least, if we cause you to feel that way now that our future conduct will be such as to dispel this feeling. I have been dealing with the public for twenty years and have learned that I need your

help. With regard to whose business it is if some one charged with certain duties is manifestly not discharging those duties conscientiously, I confess to a desire to correct anything I see that is radically wrong. That great improvement could be made in the conduct of many government officials of all classes I have no doubt, and hope I am charitable enough to begin at home. Not infrequently do we see private enterprise, because of competition, doing better work than is being done by the government along the same lines. On the other hand, there is not the incentive of private gain on the part of the government man that sometimes makes for inferiority of product. It seems to me that we who serve the public should, when appealed to, try to put ourselves in the other man's place and do for him what we could reasonably ask that he should do for us were our positions reversed.

CENTRALIZED CONTROL OF TUBERCULOSIS THROUGH THE UNITED STATES PUBLIC HEALTH SERVICE

By B. J. LLOYD, M.D.

WASHINGTON

THE topic assigned to me to-day is: "What has more centralized control to offer in solving the tuberculosis problem?" my division of the subject referring to the activities of the Public Health Service.

What, then, has the Public Health Service to offer in the way of more centralized control in solving the tuberculosis problem? Are we to sit in smug satisfaction because of our successes with other diseases and see 150,000 of our people die every year of this disease while several times that number eke out a miserable existence day by day, trying their best to earn their daily bread under conditions which rob them of their happiness, paralyze their efforts, and oblige them to pass this terrible disease on to their children? God forbid!

Let us ask ourselves the question—What is the tuberculosis problem? In other words, what are the factors in the spread of this disease? Reduced to the lowest terms, they are these: the tubercle bacillus on the one hand and the newborn baby on the other. Inasmuch as no baby is ever born with tuberculosis, if the two could be kept apart there wouldn't be any tuberculosis problem. In the present stage of our civilization it is hopeless to imagine that we can by any means prevent all infection or even a considerable part of it, and, important as prevention is, the care of the child, whether before or after infection, is of perhaps even greater importance than the attempt wholly to prevent infection. This care and education of the child reaches the very foundation of our civilization and parents have to be educated along with it. Anywhere from 75 to 90 per cent. of all persons living in civilized communities become infected with tuberculosis before the age of 16 years; the greater part of these, if properly fed, clothed and housed, and provided they will let whisky alone will be able to resist the infection throughout life and may never develop symptoms; a few may develop active symptoms and die of the disease under the most favorable conditions; many, in fact most of the persons who are once infected may and do break down under adverse living conditions.

With regard to the way infection takes place, we breathe, eat or drink the germ, sooner or later, generally sooner (in early life). The source of supply of these germs are human sputum, the most important, and milk or milk products (bovine type of tuberculosis). Other sources and modes of infection are of such relative infrequence as to be almost negligible.

Physicians, health authorities and social workers generally are agreed as to the things which ought to be done in the fight against tuberculosis. In general, the measures recommended and in use are:

1. Care of the actively tubercular, at home, in clinics and in sanatoria which serve the double purpose of removing the open case and making it harmless and of benefiting the individual. The so-called "home hospital" plan of treatment and the farm sanatorium are, in my opinion, worthy of further trial and development.

The visiting social worker, and particularly the visiting nurse, is of the greatest value in the home care of the tubercular. Such workers should of course have adequate training and be temperamentally fitted for this work. The visiting nurse is one kind of home missionary that I most heartily approve of. Home hospitalization as tried out in New York is an experiment we are all watching with a great deal of interest. The farm sanatorium also appeals to me very strikingly. Tubercular patients, to do well, need to be cheered up and you know when you have plenty of good, plain food, an abundance of good, fresh air, and just enough to keep you busy it's pretty hard to get the blues especially when you can hear the birds a-singing, the bees a-humming, the hens a-cackling, the pigs a-squealing—in fact, about the only thing that croaks on a farm is a frog, and that's musical. I was born on a farm and we had everything that went with it, the old swimmin' hole, the old oaken bucket, the measles, the whooping cough, the seven year—I mean the seventeen year locusts, and all the rest. Little did I ever dream when I was a boy that bacon which was then six cents a pound if you bought it would ever become a luxury; and, speaking of pork and bacon, I'll wager that I can take two good, strong men and a colony of tubercular patients and if I can get a few acres of land and the garbage of a medium-sized city and a stock of perfectly good hogs, I will in a few years take care of the city's garbage for nothing and put the farm on a paying basis. The people of the city of Denver pay $1.00 a year for the disposal of their garbage, and the firm which disposes of the garbage is making money at it.

There was a time when the sanatorium was regarded as almost the whole fight against tuberculosis, and, while we now know that this is not the case, we should not underestimate its value in this work.

2. The prevention of bovine tuberculosis, either by preventing the sale of milk from tubercular cattle, or by universal pasteurization, or by a combination of these methods. In the present state of the work, pasteurization is perhaps our best measure against bovine tuberculosis.

3. Educational measures. One benefit of a few months in a sanatorium is that it enables the victim of tuberculosis to take better and more intelligent care of himself, and also it teaches him to keep from being a menace to others. The general public should be encouraged to visit sanatoria for the information which can thus be disseminated. Literature distributed in a general educational campaign should be concise, terse, emphatic, every word strictly true, and should appeal to the "human" element in the reader, as well as to his reason and common sense. It should carry a "punch." The Health Crusade among children is potentially the great-

est educational movement that has ever been launched for physically better men and women, nor is there anything but uplift in this plan; furthermore, the movement has been launched right in that period of the child's life when it will do most for him. Childhood learns easily and remembers forever. It is to the child that the open case of tuberculosis is so terribly dangerous; it is the child who is forming those life habits that will protect or wreck the adult according as these habits are, or are not, wisely formed. We should double the salaries of our teachers, and require those of our primary grades to be trained nurses. It would be an excellent investment.

While we are on the subject of schools, let us not forget the excellent results that have followed the establishment of open air schools for tubercular pupils, and the fact that such pupils do well in the open air schools should set us to thinking about better ventilation and the possibility of extensive open air schools wherever practicable for the healthy as well as for the sick.

4. Better living conditions, more and better food and clothing for the poor, better housing and working conditions, closer supervision of the lives of the working classes by persons competent to advise and help, particularly by physicians, nurses and social workers. These are subjects which can only be mentioned in a short paper. The honest and efficient administration of the graduated income tax is a great potentiality in the equitable distribution of the world's wealth. This income tax is, in my opinion, the greatest advance man has made in reference to taxation. No doubt improvements can and will be made in the present tax and one improvement would be an exemption of $500 or $1000 for each child instead of $200 as at present. I do not know how much congressmen's children are worth, or cost, but I have very specific information with regard to some others.

5. There is the question of the indigent and partially dependent tuberculosis victim. No satisfactory solution of this problem has yet been found. The fact that a person has open tuberculosis is not prima facie evidence that such an individual must forever after refrain from working. On the contrary, under present conditions some people, and there are many such, must do a certain amount of work notwithstanding the fact that they have tuberculosis. Graduated work of certain kinds may not be a bad thing for many victims of tuberculosis. Unproductive idleness is always harmful to a normal industrious individual. It may be possible that society will one day recognize that the actively tuberculous individual is seriously handicapped in his struggle for existence and will either provide him with special work or put a premium on his labor, or both.

What has all this to do, you ask, with more centralized control? Well, in order to point out the advantages of centralized control, one must know what is to be controlled.

Why more centralized control? At present there are many Governmental Departments, national, state and local, working each in its own way on these problems; the same is true of industrial organizations such as fraternal bodies and life insurance companies; the same is true of be-

nevolent organizations, such as the National Association and charity organization societies. No doubt there is duplication of work; no doubt there are some who are not doing effective work. I am in entire accord with the proposal of the National Tuberculosis Association to create a division of tuberculosis in the Public Health Service, and this division should be placed in charge of a man or woman who, in the first place is a harmonizer, one who has energy, faith, tact, sympathy, vision, executive ability, one who cannot be discouraged, who never knows when he is whipped, who has enough Scotch blood in him to know the value of a dollar, and one who, when he knows he is right has grit enough to run over somebody who refuses to get out of the way.

Phases of the work which would particularly fall within the province of a bureau of tuberculosis in the Public Health Service are: The coöperative correlation of the activities of all bodies and departments of government engaged in tuberculosis work whenever this would contribute to efficiency and economy; a campaign of education jointly with or independently of other organizations, or both; field investigations with authoritative publications on the needs of the work and the result of the application of tried measures; the care of Federal employes who are victims of tuberculosis; the detail of trained men to inaugurate anti-tuberculosis work where trained workers are not available; research work in the hope of discovering more effective means of prevention and treatment, and certainly we should contribute to the solution of the problem of the indigent migratory case who wanders from state to state in helpless poverty.

Finally, a word with regard to the National Tuberculosis Association and its subsidiary bodies.

In taking up the work of protecting the human race against tuberculosis you have on your hands an undertaking of stupendous magnitude. The building of a Panama Canal is as a day's work in comparison. Napoleon said that the imponderables were of incalculable value in winning a battle; by that he meant that indefinable something which we may designate as collective spirit, the spirit of an army or the spirit of a nation. Compare, if you please, the spirit of this nation with that of China and you will know what I mean when I speak of the imponderables, or compare the spirit of the armies of Europe a few days before the American troops went over the top at Chateau Thierry and the spirit that was manifested by them from that time on.

You men and women who compose the National Tuberculosis Association, in addition to your very material contribution to the fight against tuberculosis, are the imponderables; yours is the spirit of optimism which gave birth to the little Red Cross Christmas seal, yours is the spirit of foresight which launched the modern Health Crusade; yours is the spirit of the Good Samaritan who binds up his neighbor's wounds, and, taking Trudeau as a memorable example of dogged determination, yours is the spirit of fighting perseverance which, handed down to succeeding generations, will eventually free mankind of this terrible disease.

CENTRALIZED CONTROL OF TUBERCULOSIS BY STATE COMMISSIONS OR DIVISIONS OF TUBERCULOSIS

By EUGENE R. KELLEY, M.D.

Boston

By reformers of all species, political, physical, economic and moral, "centralized control" as an abstract principle has been often advocated as the magic talisman for the solution of all types of problems that vex our civilization.

Recently the principles of centralized control have been attempted with at least in the beginning, the hearty coöperation of an overwhelming majority of us, and on a scale never before seriously suggested in this country.

Something went wrong. We do not know yet just what or just how, but we are all agreed that the principle of centralized control of our public utilities and means of communication and transportation has received a staggering blow that will be felt as long as most of the present generation lives.

These facts are obvious to all. I firmly believe they are not of merely academic interest to us in the tuberculosis field, but on the contrary contain a very distinct warning and guide as to how we may hope to evolve more efficient methods of tuberculosis control without antagonizing the great mass of our fellow citizens.

One tenet of the dogma of centralized control has suffered more than all the rest. It is the often enunciated principle that greater centralization of control of anything inevitably leads to greater efficiency of operation and greater volume of result per unit of cost.

Anyone who has occasion to depend upon telegraph, telegram, mail or express service knows now that this doctrine is not always true.

But if we look a little deeper into the subject before condemning the principle outright, we must try to draw a sharp distinction between centralized control based on autocratic principles and centralized control based on democratic principles.

Some may say that the phrase "centralized control on democratic principles" is a self-confessed contradiction in terms, that there isn't any such thing. On the contrary, I strongly believe not only that such a policy is possible, at any rate in tuberculosis work, but that it is the only method by which sound anti-tuberculosis measures can be laid out. It simply means accepting the basic principle of American government, to

wit: That the greatest activity and greatest responsibility should be exercised by the ultimate governmental and social unit, the community, which translated into American political terms means the municipality, town, parish or county.

Real tuberculosis control must spring from intelligent interest in the problem being always awake in these community units, both in official or governmental and non-official circles. This is the only sound fundamental basis upon which real state centralized control policies can be constructed.

Autocratic state-initiated, state-financed, state-officered systems for tuberculosis control are in existence in this country. They can point to splendid achievement. I will gainsay none of the supporters the right to believe they represent the most efficient and hence the most useful method of tuberculosis control, only I cannot bring myself to believe in them.

Prussian methods were also efficient but the soul of the world revolted against their application. Just so I believe there must be a social soul inspiring our tuberculosis movement, and I do not believe such a social soul, or social consciousness can be developed in the tuberculosis movement by producing complete self-functioning Federal or state systems of tuberculosis control and then directing the ultimate social units in which the consumptives live to open their civic mouths and swallow such systems ready made.

The ideal of a democratic system of centralized control must rest upon the fundamental concept that the state should do only such things as will assist local communities to perform better the anti-tuberculosis functions and obligations that rest upon them, or should do such things as trustee for the local communities as they cannot separately do as effectively or economically. By this theory the progressive community with a highly awakened civic conscience in respect to its tuberculosis problem should naturally look to the state to see to it that less progressive communities do not shirk their fair share of the tuberculosis burden, and thereby with the typical spirit of the "slacker" impose on the wide-awake community a portion of its "slacker" neighbors' tuberculosis burden in addition to its own.

I have laid down before five great lines of attack upon tuberculosis which I believe must be kept actively in mind by every state which essays to develop a complete anti-tuberculosis problem. The element of central state direction enters into every one of these methods if they are to be truly successful. It is equally true that the best conceived plans in these directions, if put forward solely as a state governmental project, will fail dismally unless each local community develops its program along these lines, and in fact carries out all the bulk of the detail of execution, leaving to the state the important yet supplemental function of correlating the work of the individual local communities, serving as a clearing house of information, keeping clear record of the interchange of infected persons from one local community to another, and extending financial assistance by institutional resources, or otherwise where necessary, to supplement local facilities.

These five special heads of the anti-tuberculosis attack I have developed for convenience as

1. Protection against bovine tubercle bacilli infection.
2. Control of childhood infection (infant, child and school hygiene).
3. Locating of existing tuberculosis (reporting system).
4. Adequate "follow-up" of tuberculosis sufferers domiciled at home.
5. Adequate sanatorium and hospital care.

It needs but a cursory inspection to convince one that a certain degree of centralized supervisory control on the part of the state as to the manner and time of attack is absolutely essential to reach any of these five objectives.

If this can be brought about without stifling the initiative and paralyzing the sense of local responsibility towards its own tuberculosis problem of each of the local community units that collectively make up the state, and if all the states of the Union intelligently strive together under the general guiding advice of a wide awake tuberculosis control division of our national Health Service, definite results may soon be realized in the direction of ultimate, real control of the "great white plague." Practically all of these five groups of measures must in final application become functions of organized governmental agencies.

The fundamental function of the tuberculosis association, however, must be to furnish what, for lack of a better descriptive term, I have designated as the "social soul" of our anti-tuberculous movement in each local community unit throughout the land.

For a considerable time when and where organized governmental machinery is lacking or but partially erected the impelling force of a needed public service may fully justify, for the time being, the entry of volunteer tuberculosis organizations into many fields of activity which most of us now agree are essentially governmental in character.

But if the voluntary tuberculosis societies, all of which head up in this great national body, to whose activities and initiative the official health agencies owe a debt of gratitude they never can repay, do not always keep in mind that their greatest, their most essential function, the function that no other agency can ever supply, is to keep this "tuberculosis community conscience" awake and active in every city, county and village in the land, they will have failed to grasp their greatest opportunity, they will have been derelict in their most solemn duty.

CENTRALIZED CONTROL OF TUBERCULOSIS BY DIVISIONS OF TUBERCULOSIS IN COUNTY OR CITY BOARDS OF HEALTH

By GORDON K. DICKINSON, M.D.
Jersey City

When Mr. Easton said open the window, I felt as if I would like to fly out through it, because all I can do is to repeat that which has been so well said previously. The topic says "Control." If you will look over the story of the sanatorium and hospital situation, you will see that there has been no control except individually. We talk about boards of health. Have we any? In this state there are some 400 odd titled as such and there are not more than three or four that have a right to the name; the rest draw the salaries and take their picnics. Perhaps a little different way of looking at it would be to go over a little of my history. Some dozen years ago one of the philanthropists in Hudson County requested us to do something for the tuberculous sick. It was suggested that perhaps the horse cars which were being discarded might be put up on the hill, and used for consumptives. The problems of cooking, nursing, and domestic work were overlooked. But we got together, we had talks and interested the people, and, through them, touched the party leader or boss. He was a kind-hearted man, a man who appreciated that to do some benefaction was policy, and in a short time we had an institution started in the best part of Hudson County, which of course was not very good as the county is small and thoroughly built up. It was then the fifth sanatorium in the United States. We had no guidance, we had no one to tell us what we should do or how we should do it. We guessed our way in. As a consequence we began with the expectation of having a sanatorium to care for the consumptive who was not very sick, but instead of that we filled it with dying men, and we have had from that day those who are incurable. We hear a good deal in these meetings of the tuberculous. We have the tuberculous infection, we have the tuberculous lung, but we have also that which is worse, and which is spoken of in definite terms, and that is, tuberculous persons with pus infection, pus germ infection, and when they have that, they never get well; you cannot get them well. We never saw one do any better than to get some sort of a recovery, only to relapse. They are there for life, but if you have a pure strain of the tuberculous germ you can do something with it.

That is the way we started—all optimism, all hope, and we were thrown down immediately. We had no guidance. We looked around the state; we formed state organizations; we tried to get the State Board of Health to help us out; they were working on other problems. The tuberculosis

problem is an issue in itself, and unless you are thinking in terms of tuberculosis, unless you train your mind in that direction, you are not going to accomplish much. At any rate, we made all our endeavor with the state and failed on that. We had the state law formed. A man went through the state with an exhibit. Nothing of any importance is being done by the state at the present time. I feel very much with the others that we should have individuality unsuppressed. I do feel that we should have a certain amount of state control, but I believe above all if we want to make a great big movement enormously successful, we must have some regulation from higher authority, such as a national one. The greatest piece of paper that has ever been written is the Constitution of the United States, and if we want ultimate success in a movement of this type we must perhaps copy the plan of the United States Constitution. We must have individual endeavor, we must have individual organization, but it should be knitted up to the state, and how? By having every local organization represented in some state organization, a representative of the local organization being compelled to attend meetings, and to enter into its work. Every state organization should be under the national organization.

I have often thought that the method of the heart beat could be copied in this. We all know that the heart goes on beating in spite of ourselves, that we cannot control it, we cannot stop it, we cannot hasten or slow it. It is all brought about by the fact that running down through the heart is a little slip of tissue; it is not nervous, it is not muscular; it is neuromuscular; it is an electrical organ, and as the sodium in the blood passes over it it produces an electrical discharge and that sets the heart beating. It is a constant quantity and it is connected by two important nerves to the nervous system to be regulated by it. In a similar way local endeavor should be connected with the state, and with the government, to be regulated, not controlled. The word control is not democratic, and all democracy is autocracy in the reverse order, so I think from my experience that the county and civic control of the tuberculosis movement is a bad one. I think that state control may be good in some states, like Massachusetts, but it is not best for the majority of states. We should have governmental control, we should have governmental initiative, and we should have government suggestion. Standardization as expressed yesterday does not quite suit me, although I am the chairman for the state in the control of ordinary hospital standardization. You cannot put ready-made clothing on all people; it would not fit. We must have something to live up to, and if you have standardization you are going to have something to live down to. I am earnestly with the others for government control.

DISCUSSION ON PAPERS BY DR. LLOYD, DR. KELLEY AND DR. DICKINSON

Col. Homer Folks, New York: The papers this morning on the subject of coördination of the nation, the state, and the local authorities set running in my mind currents of thought and feeling that have been more

or less dormant for a couple of years. I think that a very good principle of control from the top was enunciated some nineteen hundred or so years ago in the statement,—Let him who would be chief be the servant of all. I think that pretty fairly expresses the thing as it really is, that the national authority, the division of tuberculosis in the public health service, is very seriously needed, and has a very big job to do, and its source of power will be in being the servant of all, for certain things that we need and cannot readily and conveniently get for ourselves. There is a very profound philosophy underlying that saying, because it is the efficient servant of all who really controls everybody, I think. This paper control, this statutory control, does not really work in human affairs when you get under the surface of things. It is the useful man, the person who has a strategic position to be useful and makes the most of it, he it is who controls the situation in the long run. That applies also to the state association. The state association should be the servant of all its local branches, and do for them a great many things that they cannot economically, quickly, advantageously do for themselves because they have not the breadth of experience, they have not the wide horizon, and they have not a good many things to go by. If the state association is a clever and efficient body, and is not trying to say "Verboten" every few minutes, but rather says "Push on, we will help if we can," it will *really* control in so far as there needs to be any control.

I think I should say that the reactions in my own mind were that we need to have a great deal more done by both rather than to be too much concerned as to forms of organization. It is not so much a question of which is the head, but of both getting busy and doing something about things. There is so little done, relatively speaking, by either the locality, or the state, or the nation, that in a way it is hardly worth while to worry about which is going to control the other one. It is much more important to get busy and do something. We cannot have a completely centralized control; that is perfectly obvious; we cannot have a completely decentralized control; that is also perfectly obvious; we must have a federated democratic coördinated system; that is both inevitable and desirable. I do not think we should be drawing too many conclusions from the experiences of the last two years, about the telephone and the telegraph, and so on, because generally it will be admitted that conditions have been a little bit abnormal in the world at large, and that an experiment in governmental control of things would not really be finally demonstrated by what it might do by the first one or two years under war conditions. I am now only saying let us not go too hastily from one end of the thing to the other. It is very aggravating in a state organization to have your local societies go off and do things they ought not to, and not do the things you want them to do, and all that, just as it is for the National Association, and the organs of the government, very aggravating, when your state organizations will not hew to the line you lay down. As a state executive, I think I am disposed in the long run to pocket a good deal of the discomfort arising from too local tangential tendencies and put up with it, and also more and more, to be disposed to think that a good deal of it is a register

of my own lack of efficiency and philosophy and insight. But insofar as we become more wise and clever and more patient and understand the whole scheme of things a little better, we get away with most of these situations and the rest of it is the inevitable wastage of energy of a great big country, having a great many people. You must not look for 100 per cent., in anything anywhere at all; if you get 70 or 80 you are doing pretty well.

It is a little hard to adjust one's mind right away to the problems on this side after being out of them for a couple of years. The first thought and reflection which keeps running through one's mind is, We are so much better off than the people in Europe, and generally so much further along, why do we fuss so much about little questions of method? These are such little things to be bothering about and quarreling about, let us go ahead and tend to the rest of the job. The problems that the people are facing across the water and which we see to such a slight degree, are so out of proportion to ours, are so much greater, so very much more serious, so very much more fundamental, that our own problems seem altogether simple and easy.

Lawrence Veiller, New York: It is quite evident that Colonel Folks has been abroad a *long* time. No one who has been in this country during the last two years believes that the American public is prepared to endorse government control.

I had hoped that we would get out of this subject a discussion of methods. We all agree with Colonel Folks, of course, that contrasted with the terrible conditions that he has witnessed in Europe our problems seem petty, but that is not the point. The war is over, and our regular peacetime jobs have been accelerated by the war to some degree. What we are discussing this morning is: what is the machinery, what are the tools, what are the methods that in our fight against tuberculosis along well-known lines will develop the greatest results. Some of the speakers have taken it as a matter of course that we ought to have a Federal Health Department in the Federal Service. I was very much amused to note that the speaker from Washington could not help reflecting the Washington point of view and referred to federal matters as "governmental." The state evidently is not governmental to him nor the city, but only the federal government is "governmental." It was an unconscious revelation of how Washington thinks. I find that most of us in the National Association are accepting the idea that we want a Federal Tuberculosis Division of some kind. Do we? I always have to be devil's advocate and take the unpopular side of things, so I am going to raise the basic question whether in the long run the tuberculosis movement will advance more rapidly and more effectively through the creation of a Federal Bureau of Tuberculosis than without it. There is no question that there is a field for local, city, village, county, state and federal activity. But that is quite a different thing from saying that there should be all of those activities from a governmental point of view. Suppose we have a Federal Tuberculosis Division, what is it going to *do?* Some of the speakers have said it was going to be a center of information; it was going to do research work; it was going to guide the

various state departments. I can see the federal government trying to guide a state department! They can guide the people in the state, but not the state government.

Now suppose we have such a division, what is to become of the National Association? You have turned over to the federal government the entire job of the National Tuberculosis Association. It may be a good thing after a Federal Tuberculosis Division is created for the National Association to vanish, but my experience, extending through a good many years, teaches me that federal and state, or we will say governmental activities, get into a rut, that they lose initiative. I cannot see that there is room for both these activities, a Federal Tuberculosis Division doing the kind of work we have enumerated and a private association occupying the same field.

Of course, there must be a centralized national bureau furnishing information and guiding and developing and showing the right way and doing research work. We should have a clear division between government and private initiative within a single locality, and that is where some of us in the anti-tuberculosis movement have made mistakes. We have started in when we saw the need of a sanatorium and have built it ourselves and financed it privately and tried to run it, instead of recognizing that it is not the job of private enterprise to do those things, but to bring about a public sentiment that would demand that the government do them because they are primarily government jobs. They are beyond the power of philanthropy or public spirit or private good will.

So I think the time has come in our ten or twelve years of activity in this movement to clear our minds once and for all and to lay down certain well established principles and say clearly, "This is the field of private enterprise; this is the field of the government; this is the field of the nation; this is the field of the State; this is the field of the county; and this is the field of the city and village." We have not done it.

I hope the National Association will feel a distinct call and obligation to do it. If we cannot do it at the end of twelve years, when are we going to do it? We know what our fight is; and we have to choose the weapons.

Dr. Louis I. Harris, New York: As the sole official representative of the Health Department of the City of New York, I feel desirous of presenting a viewpoint which is influenced by our local experience, narrow and peculiar as it may be. First let me state my interpretation of the subject for discussion, so that we may each of us ascertain whether we agree in a correct understanding of the terms of the theme as stated in the program.

"Is centralized control of tuberculosis work the proper form of control?" I interpret the term "centralized control" as meaning centralization in the hands of a governmental agency, whether federal, state or municipal. It seems to me that merely to state the problem is to imply the obvious answer. We have, several of us, as for instance Dr. Dickinson, touched upon the failure of municipal and other governmental enterprises in connection with health activities in a strain of pessimism. Suppose that governmental health agencies have been failures. Does

that invalidate the correctness of the principle of governmental control? Shall we on that account change the goal, trend, and the direction toward which inevitably our faces must be set? That is the question in a nutshell, as I view it. Suppose a thousand departments of health, state, county, and local have failed. Suppose,—and I state this only as a supposition,—that the United States Public Health Service has not measured up fully to its possibilities, its opportunities, in many particulars; should that damn and shut off forever all enterprise along the one right direction? What is the purpose of the National Tuberculosis Association or of any other non-governmental health agency? To constitute itself a directing and governing agency? Not at all.

As Dr. Kelley well said, it is to stimulate and create a social conscience in the community; to teach the lagging departmental governmental officials their duty which perhaps they have failed to appreciate, or thoroughly measure up to, for decades. It is their work to bring governmental officers to a realization of their obligations, and to teach them that an autocratic centralized government—I like that term of Dr. Kelley's,—is a failure, when it forgets that it is obligated to render an accounting to the community and especially to the people who are interested in the work because of their expert knowledge, and because they can contribute, through constructive criticisms and otherwise, to the effectiveness and success of his endeavors.

It is the function of the National Tuberculosis Association to teach that type of autocratic officer that he must turn to those who are authoritative, to those who have an aroused social conscience, for support, information and coöperation. It is the true function of the National Tuberculosis Association to rouse the public health officials on the one side, the legislators, the political leaders, and the citizens generally, and also the maturing boy and girl to an understanding of the vital issues involved. But we must not for a moment forget that ultimately, in a democratic administration of the affairs of the country, or of any particular political sub-division of it, officials must be enlightened and stimulated. Insofar as these things have not yet come to prevail it is the function of the National Tuberculosis Association in the coming years to bring this to pass. Private enterprise may study, stimulate, inform, and serve as a vigilance committee, but it is the function of governmental agencies to control in health work.

In the epidemic each health officer had his particular problem to solve in his community. It devolved upon the Bureau of Preventable Diseases over which it is my privilege to preside in the City of New York, to control,—insofar as control was possible,—the influenza epidemic, and subsequently, to tie it up with the tuberculosis work of the Bureau. We found endless confusion arising from the efforts of good-natured, very estimable and well-meaning private individuals and agencies, who thought they had a mission to fulfill and who felt that there was indeed a tremendous amount of work to be done. The public health agencies throughout the country had failed to prepare themselves to cope with the grave emergency, partly because of lack of

foresight, also because of lack of experience, and above all for lack of central governmental leadership. Because health departments were not prepared adequately to meet the situation, a number, representing private agencies, sought at first to deal singly and independently with the situation, prompted by a sincere desire to help out. And what happened? Intolerable confusion and much work at cross purposes. The Health Department had quickly to place itself at the head of these various agencies, organizing them and controlling them so as to bring some measure of harmony and efficiency out of confusion. I do not say that we succeeded quite as much as we desired in coördinating the work of these bodies, or in controlling the epidemic quite as we might have desired, but that was not the point. It was essential that there be one controlling agency having the power, responsibility, authority, and the facilities for bringing team-work among the varied organizations, to arrive at a specific and definite goal. The goal and purpose of the future work of the National Tuberculosis Association is, similarly, to encourage and stimulate the governmental agencies, to consolidate and combine all agencies interested in the prevention of tuberculosis, and to awaken in such officers an understanding of the need of team-work and of the need and value of concerted effort to this end. Health officers need badly to be taught their duties and their opportunities, but that does not at all minimize the fact that they are the legitimate leaders of anti-tuberculosis work.

I have not the opportunity to develop the thoughts which have been suggested to-day, but I am anxious to touch upon a few fallacies which are commonly accepted without challenge. The first is with reference to the value of much of our literature in an educational way. No one will gainsay the need of educational literature; we are all agreed upon the essential, the cardinal importance of proper educational measures; but does literature generally educate? How often have tons of matter been printed by the Health Department of the City of New York,—and I speak of the City of New York and my local experience at the risk of being thought provincial, but I think it is equally true elsewhere,—which, although apparently distributed in quite an effective way, has apparently done little good. Recently, to cite an example, we had a very definite experience of this character in connection with our campaign to popularize typhoid immunization. We obtained the aid of the advertising expert of the Interborough Rapid Transit Company, who designed a carefully worded advertisement which was exhibited in every car of the surface, subway, and elevated systems and on the station platforms. Despite this, the number of typhoid immunizations was 5000 less in 1918 than during the preceding year. I might cite other instances of failure of the printed word alone. I have come to believe that education through personal contact by means of health crusades, through the spoken word of medical officers and visiting nurses, and education that is intimate, personal and direct, that results from coming face to face with the person to be educated, is the essential, the big thing in public health education. We waste a tremendous amount of time and effort if we merely send broad-

cast literature without sustaining and supporting it and paving the way for it by an aggressive system of personal visitation, and personal follow-up in the homes especially. I had to overcome much criticism and opposition, a year ago, before I could reinstitute in New York City home visiting by nurses in cases of measles. It was argued that by the time the nurse gets to the home, those who are susceptible have already been infected. But, it seems to me, that while this is true, we should visit these cases because measles is the most widely prevalent infectious disease in the community, and not an infrequent etiological factor in tuberculosis, and it gives the nurse an excuse for entering many homes and establishing personal relationship with the families; it gives her a legitimate excuse to utilize the occasion to teach the fundamental preventive measures effective against measles. We must educate the public health nurses so that they shall be competent and know the technique of home education, and be inspired by zeal and enthusiasm as well, so as to make their visits to the homes effective, not only against measles and tuberculosis, but against the infectious diseases which have a common mode of transmission.

That, it seems to me, is the best type of health education; and those who rest supine and who think they have achieved wonderful results when they issue literature, however well illustrated and adorned, and however well phrased, are probably deluding themselves and deriving comfort from a most fatuous form of effort.

A Home Hospital in the City of New York was alluded to by Dr. Lloyd. Now that was an excellent experiment insofar as it was really a round-about and indirect way of proving to the city authorities and to those who are unofficially responsible for the housing program of the community, that housing is an extremely important thing in relation to tuberculosis. But it did not solve the tuberculosis problem to any degree. Its chief fault lay in the fact that, too often, it permitted the tuberculous patient who was distributing the tubercle bacilli quite actively, to remain in his home under the false notion that there he was getting the full benefit of a hospital or sanatorium, whose purpose it is to isolate and quarantine the patient who is a carrier of tuberculosis as well as to arrest the disease in the patient. The Home Hospital of the City of New York was, however, a very excellent example of a sanitary and well constructed tenement. This, it demonstrated quite effectively. It did show that good housing conditions can be made practical and that the best type of constructive work is compatible with profitable investment as well as an aid in promoting healthful living. Successful as a model tenement, it failed, however, to vindicate itself as a satisfactory substitute for the hospital or sanatorium. I make these criticisms with a certain amount of timidity, as I do not desire to offend those who conducted this experiment in a spirit of helpfulness and sincerity, but I think I may say advisedly, as the result of investigation, that the experiment, while it had much to commend it, and while it taught several valuable lessons, should not be regarded as a demonstration that one may keep the home intact, indulging the sentimental hope that the tuberculosis carrier who is actively spitting tubercle

bacilli, is a safe occupant of the home, because there is a nurse on some floor of the building, and because some kind of supervisory care has been installed in a tenement, which however model it may be, is a tenement house after all, and does not allow of caring for the tuberculous in accordance with the modern practice of isolating the patient.

I feel that Dr. Kelley and Dr. Lloyd have both brought out features of value. Dr. Kelley talked about the division of the state authority and city authority. I do not wish to enter upon a detailed consideration of this just now, but in summing up, or in returning to my first theme, I do not see how you will ever get a good public health administration in any community in this country or any country that is democratic, unless such agencies as the National Tuberculosis Association set themselves the serious and solemn task of aiding, supporting and guiding all other official agencies whose duty it is to educate the public. And if we health officers are not functioning well in certain communities, then it is your business to so stir up feeling, so that every community will be aroused to the importance of the question of tuberculosis prevention and other health questions from an economic, social, and humane point of view. But you shall not on account of the present inadequacy of health agencies,—if they be inadequate,—deny leadership to those who are naturally and properly leaders in disease prevention and control, and who should be bound by ties that are most intimate with your agency, and with every other agency, provided that they are not acting independently and autocratically. The health officers will then reflect the enlightened sentiment of the community which the National Tuberculosis Association may stir up.

William H. Baldwin, Washington: I am sorry that on account of some other things I had to attend to I was not here in time for the first part of this meeting because I am sure it would have been of great interest. But I did come just at the time that the "devil's advocate" was beguiling the audience with some of his ideas, which I always like to hear. I agree with him pretty largely in most things, but I do not want to have any mistake made about one thing. What we want to do now at this session of Congress, and what we want the help of everyone who is interested in tuberculosis in getting done, is to pass the Ransdell-Esch bill for the creation of a Division for Tuberculosis in, and an Advisory Council for, the United States Public Health Service. This is not going to reorganize things, or do anything that will interfere with what the National Association is doing. In fact, in writing on behalf of the Association to Senator Ransdell who introduced the bill in the last Congress, which has been carefully gone over by the Public Health Service, as well as the Executive Committee of the National Association, we stated distinctly that the National Association would continue to do all that it had done. But we need this Division of Tuberculosis in addition, because there are certain interstate relations and other matters that the States even cannot control. The bill has been carefully considered, and should have the support of the federal legislators and the other people who are connected with the tuberculosis movement. The National Association has done much. Perhaps you have read in the

JOURNAL OF THE OUTDOOR LIFE the history of it in connection with this letter I speak of. Mr. Esch is the Chairman of the Interstate and Foreign Commerce Committee. Public health and tuberculosis and all such matters, when they are considered in the House, have to come in behind the railroads, telegraphs, the public utilities and similar matters that come before the same committee. No one could be kinder and more favorable than Congressman Esch. Consideration in the House depends upon whether he gets their attention. The plan is to have the Committee on Public Health and Quarantine in the Senate, of which Senator Ransdell of Louisiana was formerly chairman—nobody could be more sympathetic and interested than Senator Ransdell—take the lead. He was asked by Senator France, who is now chairman of the committee, to introduce the bill. We shall try to have the Advisory Council consist of ten of the best men in the country, appointed, two of them each year, for five years. They will get ten dollars a day for expenses when they serve, and they will not serve more than ten days a year. They will be in touch with the Public Health Service and will furnish the element that Dr. Harris wants.

The Chairman: I am going to ask Dr. Hoffman to introduce the next speaker.

Dr. Frederick R. Hoffman, Newark, N. J.: We are fortunate in having with us one of the foremost authorities on public health administration, not only in Great Britain but throughout the world, and one who has made a special study of the tuberculosis problem in its particular reference to the questions of effective segregation, treatment, and cure. Whatever Sir Arthur Newsholme may have to say to us will be of real value and interest to all those present. His work on the subject is one of standard reference and it is to be hoped that he will favor us with at least a few remarks on the methods and results of sanatorium benefit under national health insurance.

Sir Arthur Newsholme, Baltimore: I am grateful to you for your kind reception and I am sorry that I was not able to hear the early part of the discussion. Therefore my remarks may not be altogether appropriate to the discussion as a whole. I have learned, however, certain general points from the part of the discussion to which I have listened, and I would like to make two points respecting these. In the first place, that no national system of control of tuberculosis can in my opinion be satisfactory which has not a complete coördination of central and state and other local activities, and if I may, as visitor to your country, make one suggestion, it would be to the effect that there is lacking at the present time any adequate system of inter-coöperation between the federal and state and city organizations. I am glad to note that the proposals which are before you would tend to increase that coöperation between central and local agencies. I should like to make the further remark that the more we can remove the segregation of the problem of tuberculosis from other public health problems the better it will be for the success of our anti-tuberculosis measures. The prevention and treatment of tuberculosis are only part of the general public health

problems, and the success of our anti-tuberculosis work will depend very largely on our realizing that fact and living up to it. It is extremely important, both on the voluntary side and on the official side, both locally and centrally, that all measures on tuberculosis should be closely related with corresponding general public health measures. I gathered from the last speaker that it was proposed that there should be a bureau related to tuberculosis which should be woven into the larger Public Health Service. It is consonant with good principles and good administration, that public health measures and anti-tuberculosis measures should be intimately and constantly related to each other.

I can speak more confidently when I allude to what has happened up to the present time in England, and my further remarks I will devote to that point. We have suffered from the fact that tuberculosis has been allowed to become too separate a problem from other medical and public health problems. That arose in large measure owing to the National Insurance Act in 1911. Under that Act certain benefits were given to wage earners for which they paid so much per week, the employer paying another fraction and the State the rest. Among these were money benefits and medical benefits. The money benefit consisted in the payment of ten shillings a week, followed after a time when necessary by a further disablement benefit consisting of half the previous amount for a further period. Then there was the maternity benefit of 30 shillings to be given to the wife of the employed person, when she was confined, or if she was also herself an employed person, an additional 30 shillings was given. Those are the monetary benefits. In addition there are certain medical benefits. These were three in number. First of all every insured person, that is practically one-third of the total population of England and Wales, became entitled to domiciliary medical treatment. In any illness from which he was suffering that domiciliary treatment was given on a per capita basis by general practitioners who went on the "panel." By regulation subsequent to the passing of the Act this domiciliary treatment was limited to such domiciliary treatment as could be given by a practitioner of average ability. That excluded skilled, expert service. It also excluded the provision of hospital treatment; it excluded provision for consultants for special diseases; thus it was very limited medical treatment and it cannot be said to have worked altogether satisfactorily. There was one exception to the provision of expert asssistance; this was what was called the "sanatorium benefit." The sanatorium benefit entitles any insured person suffering from tuberculosis who was recommended for this benefit by the Local Insurance Committee to one of three kinds of treatment: first, domiciliary attendance; secondly, treatment at a dispensary for tuberculosis, or thirdly, treatment in a residential institution.

During the passing of the Bill and in connection with the political agitation in favor of it, great stress was laid on the treatment in sanatoria, and this was the main conception of the sanatorium benefit in the popular mind, with the result that the tuberculous insured persons were under the

impression that they were entitled to three months at least in a sanatorium. This has worked out badly in practice as it meant that the Local Insurance Committees have sent a large number of tuberculous patients into sanatoria who were quite unfit for sanatorium treatment, who were suffering from the more advanced stages of tuberculosis; and sanatoria often became blocked by these patients with the result that earlier and more recoverable patients did not receive adequate sanatorium treatment. Early representations were made to the government to the effect that tuberculosis was not confined to insured persons; that insured persons would suffer from neglected tuberculosis in non-insured, and that consequently it was extremely important to continue and extend what public health authorities were already doing for the population irrespective of insurance, viz., the provision of sanatoria and dispensaries and public health measures against tuberculosis. These principles were admitted by the government and they undertook to pay half the total expenditures incurred by public health authorities in treating tuberculosis, whether in dispensaries or in residential institutions. The result has been that the provision of sanatoria began rapidly to increase, and general schemes for the treatment of tuberculosis in dispensaries and in sanatoria and hospitals have made rapid progress, which, however, has been hindered during the four and a half years of war. During the war much of the sanatorium accommodation has been devoted to the treatment of tuberculous soldiers and sailors.

The main lesson from the history of the control of tuberculosis in England is that you cannot separate between insured and uninsured, and that the treatment of this disease as well as its prevention is a matter for public health authorities and not for Insurance Committees. I look forward to the day not far distant when not only in England but elsewhere the public health authorities will take upon themselves the provision of the treatment of the disease, domiciliary as well as hospital and sanatorium treatment, the provision of expert services and of nurses for the great masses of the population, and that this treatment and nursing for tuberculosis will become as much a matter of provision at the public expense as education is at the present time, both in this country and in England. That being so, one must insist upon separating any idea of insurance from the question of the treatment of sickness, and it should be regarded as a national provision for those who cannot contribute, just as much as for those who possibly might be able to pay benefits. I am quite certain that if we are to be more successful in the control of tuberculosis than we have been in the past, we must remove all impediments to the early and prompt treatment of patients and that we must watch over the tuberculous patient through the whole course of his life even though he is going down hill. We must supplement the sanatorium treatment, keeping in touch with the patient when he leaves the sanatorium, if necessary supplementing his wages, helping to pay his rent, and supplementing his food. All moneys we spend in these directions will be to the public advantage, for tuberculosis at the present time is the most common disease by which humanity is affected. It is the disease more than any other disease causing dependent

widowhood and orphanhood, and its control, however costly, will greatly increase the efficiency of the entire community.

Miss A. F. Brown, Oakland, Calif.: Is it not one of the principles of democracy that when any evil threatens the welfare of a nation, such as a wide-spreading disease, its study and check should be placed in the hands of the highest governmental authority, even though at first we may not by that method secure the most efficient results? An excellent example of the improvement through centralized and governmental control can be found in our public school system. It was my privilege for years to act on a public board of education. We found how difficult it was at first to raise the public school standard to that of the finest private schools, where those employed were only of the highest type.

I understood one of the previous speakers to say that should the tuberculosis work be placed in the hands of the government, it would not be so efficiently accomplished as in the hands of private agencies, such as the National Tuberculosis Association.

The standard of public schools, as well as other community institutions, can be raised only as high as the average intelligence of a community demands, and so to secure high standards in community problems it takes years of education and patience. But is this any reason why we should say: "No more public schools, let us cling to private institutions"?

As education is a matter of universal interest to our democracy, so should public health be. For of what avail is an excellent education built upon an unsound and unhealthy body! If the prevention of tuberculosis be of so vital importance to the health of a nation, should it not be the duty of those who have civic conscience to see that the tuberculosis societies in their communities create correct standards and develop better and more efficient methods of combating the disease, and thus foster scientific education in public health, first from the standpoint of the community, then the state and finally from the federal authority?

Is it not our function to create and maintain standards of work to advance education in public health, rather than to keep this whole field in private hands, saying: "Because it cannot be so well done we must not turn it over to the government." Far better to say: "The check of tuberculosis is too vital for the progress of a nation to be confined to private hands. It can best be handled, as it has now become a technical scientific problem, by trained experts under the government."

I feel strongly on this subject for during the last ten years our community has endeavored to carry on the tuberculosis work from a private standpoint. Privately have we raised funds and privately have we conducted clinics. It was necessary to do this until we had created public sentiment for the need of our work. From my personal experience I should say as soon as the work becomes well recognized it should be backed by governmental authority. An example of the effectiveness of such a method can be seen in the marvelous results of the Children's Year. Can anyone say that because this movement had its inception in our federal government and the directions came from Washington the results were less stimulating? Why would the result be different inthe tuberculosis work?

Mr. Veiller: You say that you have been running a clinic from private funds and are tired of it and that the government ought to do it. That is exactly the point that I was trying to make. There are certain things that are clearly the function of a private organization. Allusion has been made to our public school system. I have been holding up the public school system most of my life as a splendid illustration of what democracy can do; but to-day it is falling down. Politicians are afraid to pay an adequate salary to the school teachers because of antagonizing the taxpayer, and as a result we fail to get and keep the best teachers.

Don't let us deceive ourselves with the word "democracy." Politicians who are elected to office are not the only democrats. Let us use the word in another sense. Is not a group of citizens in the city of New York or Chicago or Boston or any other place, working on the tuberculosis situation just as democratic as the leaders of a political party? There are things that the government must do and can do better than private associations, and there are other things that private associations can do better than the government. I should like Mr. Baldwin to tell us what he really expects the federal bureau to do after it is created.

Mr. Baldwin: Anyone familiar with the Public Health Service and the tuberculosis situation throughout the country knows that there are various problems which the Public Health Service can take up, and in a way has taken up. This is done by the general employes of the Service. The Executive Committee of this Association thinks that tuberculosis itself is of sufficient importance to be dignified by having a division of its own that shall pay special attention to tuberculosis, not in order to control the states, not to interfere with what the National Tuberculosis Association has so well done, but to act in certain matters which neither it nor the states can handle. For instance there is the question of the migration of the indigent consumptive who can cross a state line now at any place he pleases and impose himself on the neighboring states, and who constitutes a great burden in the southwest. There ought to be some way of taking care of those interstate relations that would furnish at least some information about what is going on which would be reliable and would afford protection. We need such an agency, some distinct part of the Public Health Service, that can say, "We want the funds for this work, and we are going to try to find out about some of these national problems, as distinguished from the state problems." It is keeping up exactly the distinction that Mr. Veiller said was not kept up by one of the gentlemen who spoke here, who seemed to regard the federal government as the only government, and its action as the only one that was governmental. We must not forget the federal government is governmental in its part of the health function, and that it has a function which no other government, no other unit of government in the land, has. This is simply an effort to define and unify and give a leadership to that part of the government which can give us the information we want, and I want to make it clear again that it does not relieve this National Tuberculosis Association of one iota of the responsibility it has; it gives it this distinct place to watch in the Public Health Serv-

ice, along with the state governments, and the city government. I believe, with all deference to democracy, that it can only be kept up and pushed forward by the best people acting in the capacity of citizens. We should watch all of these government agencies, all the way down, but we want something we can get at definitely, instead of talking about the Public Health Service in general. We want a division of tuberculosis in the Public Health Service, that shall have the responsibility of doing something about tuberculosis and doing it right, and with an advisory council of ten men like Dr. Biggs, that can say whether this division of the Public Health Service is doing its work properly or not. We do not know anything that would constitute such an important step forward in this movement against tuberculosis as this one step. Associations like this that are free and have no political interests can watch these matters. We do not ask any of you to write to Washington directly and stir this matter up; that is something to be mapped out by the men in Congress; but we want you to know about it, to help it along so as to get a wide distribution of information about it, and in an intelligent way as American citizens to help along with something that we believe will do much good.

The Chairman: We have heard much about the need of intelligent coöperation between health officers and tuberculosis organizations and so I am going to ask Mr. George J. Nelbach of the New York State Association to tell how the tuberculosis workers of his state enlist the coöperation of the health officers.

George J. Nelbach, New York: Coöperation between public officials and private tuberculosis organizations depends to a great degree upon a mutual understanding as to the respective parts that the two groups can play effectively in the campaign. The private organization needs to recognize that while it has a place, and an important place too, in the tuberculosis movement, it does not have the most important rôle. The brunt of the campaign, the chief part in the fight, must necessarily be met by the duly constituted public authorities. The private organizations have not the means to deal adequately with the situation. Philanthropy's resources are too small, too fluctuating, to cope with this enormous problem. The ampler resources of the public must be the chief reliance. Then too, the public authorities have the prestige that goes with law and statutory authority and they have that very important resource in dealing with communicable disease, namely, police power.

On the other hand, the public authorities should realize and most of them do in our State, that private tuberculosis organizations possess many distinct advantages over public authorities in work of this kind. That is to say, the private organizations are unhampered by the limitations of statutory authority or by lack of it. They are unfettered by civil service rules, which as you all know, often thwart the best of plans formulated by the public authorities; and they are unencumbered by official regulations as to the spending of moneys. Furthermore, the private tuberculosis organizations are in a stronger position, strategically, to assume and maintain an active and advanced position in the educa-

tional campaign. They can raise funds among themselves, their friends and sympathizers for promotion work; and they can, moreover, spend the funds pretty much as they like, upon the more striking and unique methods of publicity as well as upon the more conventional ones. On the other hand, the public authorities can only have such funds for educational work as the public appropriating bodies, such as the municipal boards of estimate and the fiscal committees in the legislature, see fit to give them and, under the system of the segregated budget, they can only spend the funds along such lines as the appropriating bodies may approve. Appropriations committees are relatively reluctant to provide funds for propaganda work.

The private organizations can secure the coöperation of the public authorities, generally speaking, if they know and respect the limitations that often inhibit the action of the public authorities, if they try to have them understand how the private organizations are peculiarly in a position to do things that the public authorities cannot do at all or as effectively as private organizations can, and if their own part of the coöperative work is efficient and is performed in a large-minded wholesouled fashion.

James H. Pershing, Denver: The close of this discussion is near at hand; therefore it may be helpful at this time to summarize what has been said. It is quite clear that an issue has been raised concerning the proper relative functions of private and public or governmental agencies. We all recognize that each of these agencies has a well established place in the general welfare, but we are not so clear as to their relative functions. It seems to me that there is a clear line of demarcation. There are at least two reasons why we must depend upon governmental agencies for the ultimate solution of the problem of public health: First, there is a certain point beyond which private agencies cannot go because they do not possess the power to do the things that must be done. The adequate protection of the public health calls for an exercise of the police power—a governmental function. In the second place, the efficient exercise of the police power rests upon an enlightened and active public opinion, which, in turn, is a question of education. Education is primarily a matter of dollars and cents. Perhaps it should not be so, but the money question is one of the limitations of a private agency. The governmental agency, because supported by the power of public taxation, is the only agency large enough to deal adequately with the problem of an educated public opinion which must underlie an intelligent and efficient exercise of the police power. Practically, therefore, the matter of adequate funds and the exercise of the police power fix the line of demarcation between the activities of the private agency and the public agency. In my opinion, the present tendency is toward a larger governmental control, just as the line of development has been from the private to the public school. Some remarks have been made here to-day which indicate a lack of faith in the governmental control which may be exercised by a democracy. It is true that democracy does not always function as we think it should, but we have accepted democracy as our form of government control, and I

believe that the cure for democracy is more democracy. Temperamentally we may differ with respect to our faith in private as distinguished from public or governmental agencies. Each, however, is a well established factor in the solution of the problem of public health. The creation of the public opinion, which must always be back of governmental action, is the principal work for the private agency. This Association should support an educational program which will not only produce, but will thoroughly effectuate governmental control. The discussion to-day has contained some severe criticism of public officials. I have had considerable contact with public officials and I believe that they are a maligned class of people. I have scarcely ever met a public official who would not do his duty if he felt public opinion was back of him. Therefore, when public agencies are not functioning as they should, the condition is a symptom indicating the lack of a healthy public opinion.

In brief, therefore, the discussion this morning indicates that we all agree that both public and private agencies have their place in the establishment of public health and that the best work which can be done by such a private agency as the National Tuberculosis Association is the production of a public opinion which will support strong governmental control.

The Chairman: I just want to state that the motto of the tuberculosis societies all over the country is first to educate and then demonstrate and then finally to stimulate, but sometimes they forget to continue the stimulation.

R. H. Hixson, Jacksonville: Mr. Chairman, I want to suggest that a man be called upon who has been in the experimental process of working out coöperation with state officials, Mr. Faulkner of Georgia.

James P. Faulkner, Atlanta: This is such a surprise to me that I am not at all prepared to speak. I don't think that I have really solved any of the problems that have been discussed here this morning. I must confess that some of the discussion has had a depressing effect upon me. It seems that we are discouraged, or that we were apologizing for our existence, or that we have no clear thought on the problem.

As to the matter of coöperation, it has been my thought for a long time that the private organization should eliminate itself as soon as possible, and I have worked consistently with that in view. I have not yet reached the point where I think my organization should be eliminated, but I am looking forward to that time when it can. It may be that we shall need to stand aside and watch the situation. I believe our purpose is to stimulate just as the last speaker has suggested, and to set an example, sometimes to demonstrate a proposition, and, to get to the point the gentleman wished me to make, let me say that is the thing we have been trying to do in Georgia. We have been trying to show the conditions, and demonstrate the solution of this problem, and it has been our purpose everywhere to get the state, county or municipal government to take over the work.

In getting the coöperation of the health authorities of the State this was our line of procedure: We went to work absolutely without any reference

to the state board of health, except a desire to help if the opportunity should be given. We did our work, largely educational and fundamental, with a definite purpose to create that big bottom block that Dr. Peters spoke of the other night—public sentiment—and we succeeded. At that time we had little state health machinery except a laboratory and a part time health official; we did not make it our business to create this machinery, but kept on making sentiment for better health conditions and very soon it began to be said that the Raoul Foundation was doing the biggest work that was being done for Georgia. Statements to that effect were common whenever I was introduced to an audience. Soon this sentiment began to crystalize, and now we have a health department that is hardly surpassed and the Raoul Foundation is, by adoption, the Division of Tuberculosis, coördinate with the other divisions of the Department. This relation has the advantage that it gives us a voice in all matters of policy, and it puts the prestige of the Health Board behind our particular work.

In our tuberculosis work, wherever possible, we are making the nurse of the county or the city the tuberculosis nurse. We contribute to her support, and we require that, when she makes her report to the health department, she give a duplicate report to the Division of Tuberculosis. This is insisted upon for the reason that most general public health nurses neglect the tuberculosis work if they are not constantly watched.

I can't say that we are solving the problems perfectly, but we are making a sincere effort. This in addition may be said: We have a staff that are working hand in hand and we are not politicians; politics has nothing to do with it. We are not tricksters; there is not a trickster on the staff; we are going straight forward with a hearty interest in our problems and determined to give ourselves to the best interest of the people of the State.

Dr. S. A. Knopf, New York: I should like to say a word as to the value of coördination in tuberculosis work. I have been engaged in this work for a good many years and I have learned to appreciate the value of team work and the inestimable benefit of government help. I may seem too optimistic, but I consider that neither the tuberculosis scourge in general nor the situation in New York is as bad as it has been painted. It should be better and could be many times better, and I have reason to believe it will be better before very long. We have now more sanatoria and more open air schools than we ever had and our tuberculosis mortality rate is decreasing. What we do want is to have confidence in our leaders. Once in a while we will get a political leader instead of a scientific and absolutely disinterested one, but most of them are honest and devoted to their tasks. Don't be discouraged if politics do creep in, make the best of it or of them; I mean better the politicians. Keep on educating the public, look out for competent medical advisers, and get in touch with good, faithful city fathers and statesmen. I believe my old motto still holds good, "To combat tuberculosis as a disease of the masses requires the combined action of a wise government, generous philanthropists, well trained physicians, and an intelligent people."

Dr. Lloyd: After listening to the remarks of one of the New York delegation this morning, I suppose I am due for an apology. As a rule,

I spend half my time in giving offense to somebody, and the other half in saying how sorry I am. I was criticized because I confined what I had to say to functions of the federal government, and in doing so I gave one gentleman the impression that I thought there were no other governments, such as state, county or municipal. I did not mean to, but I did purposely confine my remarks to activities of the federal government because state and local governments are ably represented by others on the program.

I really and truly do not believe that our friend aimed his brickbat at me as an individual. My guess is that he has at some time met the wrong kind of government official, and he probably sees all government men through one pair of glasses. He says he wants me to tell him just what the federal government might do in the fight against tuberculosis. Now, I wonder where he was when I read my paper. He seems to think I ought to give him some short-cut ultra-scientific scheme for ending with tuberculosis in a little while. Now, it cannot be done in a little while. The operations of the Public Health Service are somewhat limited, and properly so, by a document drawn by our forefathers and known as the Constitution. We can investigate; we can spread broadcast as an educational measure our findings; we can plan and persuade state and local officials to agree and act on standardized methods in a concerted way, thereby coördinating their efforts, but if a leper should stroll into this meeting and I should take him into custody, as I probably would if no one else did, I would be acting on my nerve. I must refer the enquirer to my paper for most of the information he wants me to give him, but specifically, if I were in charge of a Division of Tuberculosis in the Public Health Service, the first thing I would do would be to send for him; I would send him where the need was greatest to start something, accompanied by two men like Jack Dempsey to do his fighting so as not to hamper him. As soon as he got things organized and going I would relieve him with some man who runs on an even keel and move him on to the next starting place. By and by I would send him around to check up those who had relieved him. I have been taught to work with men who would like to kick me down-stairs, and yet keep from getting hurt, and until one can do that kind of thing cheerfully he has not advanced very far in public health work. I think some of my western friends here will bear me out in this statement.

Dr. Kelley: There are just two or three things I would like to emphasize, because perhaps there is a little bit of misunderstanding. In reference to Mr. Folks' remarks, I think Mr. Veiller's statement was a pretty fair one that because he had been out of the country for two years he did not quite appreciate the present frame of mind of the American public about attempted centralized control of things in general. I brought those things out, not because they had any particular bearing on our program, but I do just want to give these plain facts as far as I have known them: Two weeks ago a representative committee, consisting of the state health officials, had occasion to confer with several of the important chairmen of the Committees in Congress. We all got this very distinct impression, we may be wrong about it, but we all had the

same impression, to wit, that we were going to have an awfully hard job for some time to convince Congress that some of the things that are now being carried out as a direct aid and assistance to the states, ought to be kept in existence. There is a very stong current of sentiment in favor of wiping out entirely direct financial assistance to the states. I think that is very perceptible. This is something you want to keep in mind on all questions such as this one,—the creation of a Tuberculosis Division in the Public Health Service.

Another point was the question of the fitting of the method to the different states. When you get down to the fitting of every health plan to the needs of the individual states, that is something that the state health officials as an organized body are right now trying to work out with the directors of this Association and the American Red Cross. We feel convinced, and they recognize it as a thoroughly fair proposition, that the best way to get real team work is to take each particular state as a particular job, a problem in itself, and work on coöperative measures to fit that individual state. It is useless to expect that a scheme that worked well in Rhode Island would work in Arizona.

Another point that I want to touch on is this, if we are not right on the fundamental principles, we are not going to get very far with our methods. That is exceedingly important. If we can get down in black and white what is the proper function of the governmental agency in contrast to what is the proper function of the non-official agency, and agree on the fundamental principles, well and good, and we are bound to find if we do not agree on those fundamental principles that we are not going to get anywhere.

It is true that government activities tend to become bureaucratic and develop a great deal of inertia; they do; I plead guilty as representing officials myself, as a representative of a class, not an individual. That is the whole point I was trying to put over this morning. That is why we need the type of stimulus and impetus that an organization of this sort can give us. It does not matter how full of zeal you are by temperament, when you happen to be on the receiving end of the brickbat for a long while you get cautious, and little by little tend to shy on general principles when you see something coming your way, often before you have time to find out accurately whether it will be essentially a help or a hindrance. Moreover, no matter how good your own coöperative spirit is it is often a very difficult thing to crank up governmental machinery of any type, I do not care whether it is the federal government or the smallest township in the United States. There are a great many cogs to grease before a governmental machine will run smoothly, and you want to remember that particularly, instead of standing off and saying, "Health officers are not efficient." No doubt that is perfectly true in many cases, but still we do not get very far with that kind of attitude. What we need is your help, and the policy we are now trying to work out deliberately, and which I think will work, is one of "team work" from the official health agencies on one side and voluntary health organizations on the other. We have agreed that in the community, in the state,

where things do not seem to be working well from our side, the official side, we will bring out frankly what difficulties we have, and on the side of the tuberculosis executives, *i. e.*, the board of directors, that they will take up the subject from their side and frankly bring out their difficulties. Then we hope that the health officials and tuberculosis officials will go into that state or community and see if we cannot get everybody together to pull in harness. That in brief is the policy we are trying to put over.

There is only one other thing I would like to touch upon which is perhaps not very clear to all, and that is the question of "police power." Fortunately, or unfortunately, perhaps in many respects, the police power, a point which I was very glad the gentleman from Denver brought out, is vested, under the Constitution of the United States not in the federal government, but in the several states. It does not matter how much we may all be agreed in regard to certain things being desirable, and how much we are all agreed upon the fact that it could be done more quickly and effectively by federal agency, if that action involves the exercise of police power, unless we amend the Constitution of the United States, it cannot be done that way. I just want to call attention to that as a fact, and in closing I want to make the plea again to get together, to use tolerance, particularly use some tolerance toward us poor health officials. You remember the old classic sign that used to be exhibited in the western dance hall—apply that when occasions come up giving you a chance to criticize our failure to get ahead, because Heaven knows we must plead guilty to many of those indictments—that sign read "Please don't shoot the pianist; he is doing the best he can."

SOCIOLOGICAL SECTION

SECOND SESSION

THE DISCHARGED TUBERCULOUS SOLDIER

PRESENT STATUS OF SOLDIERS AND DRAFT REJECTS WITH TUBERCULOSIS

By WILLIAM H. BALDWIN

WASHINGTON

THE general subject of men who are disabled or unfit physically for military service wears a different aspect because of the great advance which has been made in the knowledge of health matters since our last previous war. In this problem the National Tuberculosis Association has been one of the leaders in spreading information and pointing the way to improvement; and it was natural that because of the wonderful development in orthopedics, and the action which had already been taken by several other countries then engaged in war in providing for the rehabilitation of men mutilated and disabled in other ways, the United States should, as we entered the war, make provision both as to men and hospitals for the very best possible treatment of those who should be injured in the conflict.

OUTLINES OF THE PROBLEM

The subject, like the regulation sermon, readily divides itself into three heads: 1, soldiers still in the Army; 2, discharged soldiers; 3, draft rejects, by local draft boards or Army surgeons.

The numbers belonging to each of these classes cannot be stated exactly because the reports have not yet been worked out, but they may be given approximately.

As to soldiers still in the Army, there were in the Army tuberculosis hospitals on June 4, 1919, 5307 men, with 1008 en route to them because of transfers and admissions, making a total of 6315. This includes about 400 men recently arrived from overseas. Inasmuch as only 819 men with active tuberculosis had been found in the examination of 1,637,283 men who came up for demobilization from November 11, 1918 to April 30, 1919, it does not seem probable that any considerable number of men with tuberculosis will be found in addition among the soldiers remaining in the Army.

The question of the number of soldiers with tuberculosis already discharged is somewhat complicated by the fact that the amendment of June 27, 1918, to the War Risk Insurance law was made retroactive, and that the number of discharges for tuberculosis for 1918 is not yet known.

Of the 3823 discharges for tuberculosis given in the report of the Surgeon General for 1917, about 1200 apparently took place before October 6th, and the men would not be entitled to compensation. About 2600

were discharged on October 6th and since, most of them "not in line of duty"; but these, and probably about 6400 others occurring later, as indicated by the records of medical examinations reported to the Surgeon General's Office, were probably brought under the War Risk Insurance Act by the amendment.

In addition to these, the names and addresses of 1589 men discharged from the Army tuberculosis hospitals were received by the National Tuberculosis Association between June 2, 1918, and June 1, 1919. This makes a total of soldiers discharged for tuberculosis and entitled to compensation of about 10,600, in addition to the 1200 who come under the pension system because discharged before the Act took effect. There may have been some others, and some arrested cases may be among those certified to the War Risk Insurance Bureau with disability in demobilization, but the mortality in the Army from tuberculosis for March, April and May of this year was at the rate of about 100 per month, and losses from this cause, spread over the time, might offset any omissions or variations in the above estimates.

There seems to be no adequate basis for certain exaggerated statements which have put the number of discharged tuberculous soldiers for which it would be necessary for the War Risk Insurance Bureau and the Federal Board for Vocational Education to furnish compensation, treatment and vocational training at several times as many.

The number of men rejected for tuberculosis by local draft boards for all drafts has been definitely ascertained by the Division of Sanitation of the Surgeon General's Office to be 69,935. The number of men rejected by the Army surgeons for tuberculosis, after having been passed by the local draft boards, was 10,666 for 1,961,692 examinations. Applying the percentage for the second half of these to the remainder of the men passed by the local draft boards who were examined by Army surgeons would make a total of men rejected by the Army surgeons of 14,967, or a total of 84,902 men rejected by the local draft boards and the Army surgeons. At this rate there would have been 3343 men rejected in the 548,135 men passed by the local draft boards but not examined further, or 18,310 rejected in all by the Army surgeons; and as this is based upon 3,764,097 men examined, and to be examined, it indicates that of the men from civil life who came up for examination for the Army in the draft, 88,245, or 2.344 per cent. were unfitted for military service because of tuberculosis.

Except for an equitable claim for compensation on the part of a relatively small percentage of the men who suffered some injury after the time when they were accepted by the local draft boards and before being rejected by the Army surgeons, which has no foundation in the law as it stands, but which the War Risk Insurance Bureau is inclined to consider where the evidence is clear, these men are not entitled to help of any kind from the government, but have been returned to civil life because unfit for military duty.

The civilian agencies in every field worked earnestly with the Army and Navy authorities in promoting all plans for the welfare of these men, of whatever class.

1. SOLDIERS STILL IN THE ARMY

The Medical Department of the Army was especially alert in this effort. The difficulty in this field in civil life is that, as one of the leaders in the tuberculosis field once said, "We do not do what we know," because we have not the power to enforce requirements which would prevent or cure disease. The Army had the power, and although its course has been marked by the exercise of military control, it has resembled physicians in doing promptly that which tended to make its services in this respect unnecessary.

Change in Army Policy as to Discharges

Up to this time the policy of the Army as to men so disabled as not likely to be again fit for military service had been governed by paragraph 159 of the Army Regulations, which reads as follows:

> When an enlisted man is permanently unfitted for military service because of wounds or disease, he should, if practicable, be discharged on certificate of disability before the expiration of the term of service in which the disability was incurred.

In order to give men disabled in any way the benefit of the preparations made for their treatment and restoration, as recommended by the Surgeon General in a statement published in the Official Bulletin of April 2, 1918, the Army Regulations were changed by order of the Secretary of War in Bulletin No. 36 of the War Department, issued July 11, 1918, of which section 2 reads as follows:

> (a) Physical reconstruction is defined as complete medical and surgical treatments carried to the point where maximum functional restoration, mental and physical, hae been secured. In securing this result the use of work, mental and manual, will often b, required during the convalescent period.
>
> (b) Hereafter no member of the military service disabled in line of duty, even though not expected to return to duty, will be discharged from service until he has attained complete recovery or as complete recovery as it is to be expected that he will attain when the nature of his disability is considered. When the degree of recovery described in this paragraph has been attained, members of the military service who remain unfit for further duty should be discharged in the manner provided in Army Regulations.

While, no doubt, this policy was established chiefly for the benefit of wounded and crippled men, it applied so directly to those affected by tuberculosis that the National Tuberculosis Association had urged, even before this time, that soldiers with tuberculosis should receive such treatment as they needed before being discharged; and it is gratifying to know that in the face of considerable opposition on the part of the men to the restraint so imposed, and the natural desire of relatives to have soldiers returned to their families when unfit for further service, it has been steadily and intelligently adhered to.

Hospital and Sanatorium Provision

Provision was promptly made for the treatment of men who had tuberculosis, partly by securing existing buildings which were suitable, and partly by erecting at once other hospitals in favorable locations, of which

the largest were in the south, the west, and the southwest, and capable of expansion. Because of the armistice, it was not necessary to carry out all the plans for further extension, and the accommodations have at all times been sufficient for the needs of the Army in this direction.

In order to give the training necessary for the specialized care required by tuberculous men, a school for surgeons in the Tuberculosis Division was promptly established in connection with the Army sanatorium at New Haven, and in this way a trained corps of physicians adequate for the needs of the Army hospitals was developed. There has been constant supervision, and notwithstanding the difficulties due to rapid expansion and the circumstances of the war as to food and other supplies, the administration of the Army hospitals has been intelligent, kindly and satisfactory.

Two of the smaller hospitals, at Markleton, Pennsylvania and at Waynesville, North Carolina, were abandoned after the demobilization consequent on the armistice had made it possible to turn over the hospital at Camp Wadsworth, Spartanburg, South Carolina, for the use of tuberculous patients.

Pre-Vocational Training and Educational Service

The work of physical reconstruction under the general charge of Col. Frank Billings was begun in the Army tuberculosis hospitals early in the summer of 1918, and although the signing of the armistice interfered with plans which had been made for providing the additional room needed at some of the hospitals, it was extended to all by the end of November. While this work has included the bedside occupations and occupational therapy in wards given by women as reconstruction aides, it has also included academic instruction in classes and training in work shops which tended to fit a man for taking up some practical trade as an occupation. It has been of the greatest benefit, not only because of this practical training but because it helped to keep the men contented.

We are to hear of this subject this afternoon from one of the leaders in the Reconstruction Service in the Army, but a brief statement may be made here as to the educational work in the Army tuberculosis hospitals as it stood on April 30 last:

Patients in the hospitals		5136
Teaching Staff		
Men	169	
Women	159	
Total		328
Enrollment		
Ward Handicrafts and Academic subjects	3275	
Classes and Shops	1664	
Total		4939

There were in addition 713 patients taking recreational courses with exercise prescribed by the surgeons, making a total enrollment of 5652. Some were, of course, enrolled in several classes.

In order to get the best results from such training in connection with

the rights of the men under the War Risk Insurance Act and the Vocational Rehabilitation Act, it was provided by War Department Circular No. 132 of December 11, 1918, that there should be "in all general hospitals, camps, posts, or stations, or wherever disabled soldiers were treated, held, or discharged, one qualified officer . . . and the necessary assistants to handle all matters relating to the work of the War Risk Insurance Bureau and the work of the Federal Board for Vocational Education." It was made the duty of this officer to see that before discharge all men disabled or having claims should be fully informed as to their rights; and it was further provided that "properly constituted representatives of the War Risk Insurance Bureau and of the Federal Board for Vocational Education shall be admitted to all such general hospitals and other places" in order that they may secure all data necessary to carry out the intentions of the two acts. The purpose of this provision for coöperation is clearly to make sure that all that is possible shall be done for disabled men.

Results of This Policy

As a result of this policy soldiers with tuberculosis began to be retained for treatment instead of being discharged as formerly, and the number in the Army sanatoria increased until for some months it ran from about 4000 to nearly 5000 or over, rising to 6315 in the hospitals and in transit to them on June 4, 1919, as above stated.

The length of stay of the patients who were still in the Army tuberculosis hospitals at the end of each of the three months, February, March, and April, had been as follows:

Length of Stay of Patients Still in Army Sanatoria

	End of February	*End of March*	*End of April*
Less than 2 months	1386	1850	2088
2 months and longer	703	700	730
3 months and longer	690	507	572
4 months and longer	422	485	376
5 months and longer	1470	1581	1606
Not stated	400	..	..
	5071	5123	5372

This shows that 40 per cent. of them had already been kept for treatment four months or longer, and 30 per cent. five months or longer.

Discharges under Guarantees

In order to cover cases of men whose relatives could and would continue the special care and treatment needed by them if discharged, the War Department on December 31, 1918, by Circular No. 188, provided that in such cases men might be discharged, but not until the commanding officer was assured that the care and treatment needed would be continued. It was also provided that the names of those guaranteeing such care and treatment should be noted on the discharge papers.

By an arrangement made with the Surgeon General's Office in the latter

part of 1917 the National Tuberculosis Association has ever since then been receiving reports of all men rejected by the Army surgeons or discharged for tuberculosis, and a request was promptly made that the names of such guarantors should be reported with the notice of discharge, in order that the cases might be looked up by the state boards of health, the state tuberculosis associations and the representatives of the Red Cross, to whom the National Tuberculosis Association had been sending the names of these men. This request was promptly complied with by the Surgeon General's Office. Through information obtained by the Army tuberculosis hospitals, and confirmed by representatives of the National Tuberculosis Association, it soon developed that in some cases guarantees were given under a misapprehension of the circumstances. Colonel Brooke, the head of the Tuberculosis Division, accordingly directed, without delay, that as soon as a man was received at any of the Army tuberculosis hospitals a letter with full information as to the facts in the case should be sent to the next of kin, with suggestions that the man in question ought to remain until he had received the maximum benefit of the treatment.

This was followed by another letter on April 3 last recommending that in all doubtful cases investigation be made through the Home Service of the Red Cross before any such discharge should be granted. This wise and considerate course has very greatly cleared the situation, and the records received indicate in almost all cases that discharges made are in accordance with the policy of the Surgeon General's Office.

A tabulation by months of the reports of discharges from the Army tuberculosis hospitals received by the National Tuberculosis Association from June 2, 1918 to June 1, 1919, which no doubt covers a very large percentage of discharges from the Army for tuberculosis, is as follows:

DISCHARGES FROM ARMY SANATORIA

June	28	December	85
July	46	January	117
August	62	February	289
September	27	March	306
October	62	April	357
November	94	May	116
			1589

Of these, 217, beginning in February, have been with guarantees. The reports for May are no doubt incomplete at this date. It will be noticed that the number has risen decidedly during February, March and April, but that was to be expected as a result of the treatment which has been insisted on, either in the way of arrested cases, as most of them seem to be, or of men not likely to be benefited by further treatment.

ADVANTAGE OF THIS ENLIGHTENED POLICY

For men with consumption the question of prompt treatment is vital, not only for their own welfare, but because if the cases are not arrested they are likely to live so long in disability, and cause such a great expense to the government for their compensation and treatment.

Through its methods of insurance and medical care the German government long ago insisted on prompt treatment of workmen with tuberculosis. I remember seeing some years since, in a health exhibit at Munich, a representation of working men and women who were sent to sanatoria each year for treatment. The showing for the following year revealed some of them dead, some still in bed, and others with shovels or brooms indicating that they had recovered under the treatment. The benefits of prompt care under their system were apparent, and as to the soldiers thus retained in our Army, we appear to have followed the same wise policy but more humanely.

The relative importance of tuberculosis as a cause of disability and death is shown by the fact that out of a total of 717 deaths from disease in eleven weeks ending May 30, 1919, in the Army in the United States, 35.6 per cent. were caused by tuberculosis as against 21.9 per cent. by pneumonia, which had up to about that time been the chief cause of death.

Conditions Revealed in Demobilization

Another interesting result of the course pursued by the Surgeon General's Office as to men with tuberculosis is shown by the figures for demobilization since November 1 last, which give the number of men discharged without any disability, those discharged with a disability certified to the War Risk Insurance Bureau, and those held for communicable diseases, including tuberculosis. These figures are as follows:

STATISTICS OF DEMOBILIZATION—NOVEMBER 11, 1918 TO APRIL 30 1919, SURGEON GENERAL'S OFFICE

	Total examinations	Discharged with no disability	Discharged with disability certified to W. R. I. B.	Held on account of communicable diseases	Held for maximum degree of improvement and other causes	Held for communicable disease, including	
						Venereal disease	Tuberculosis
November	81,594	77,495	3,465	634	——	205	55
December	447,684	420,915	23,573	3196	——	1273	178
January	363,459	330,351	30,577	2531	——	924	192
February	223,386	199,563	21,710	2113	——	476	133
March	240,528	222,650	14,464	2885	529	517	150
April	280,632	252,228	24,773	2281	1350	394	111
Total	1,637,283	1,503,202	118,562	13,640	1879	3,789	819

(These figures do not include men in the Students' Army Training Corps.)

It will be noticed that, as against the percentage of 2.344 per cent. of men found unfit for military service because of tuberculosis in some one of the several examinations of those who came in from civil life in the draft, only .05 per cent. of those who came up for demobilization were

found to have active tuberculosis in leaving the Army. This striking difference should encourage us in the struggle against tuberculosis, because it is a demonstration of what can be done by excluding those who have the disease and giving the remainder plenty of fresh air and nourishing food, even though there may be some hardship connected with the lives they lead.

The figures as to men held for venereal diseases instead of being discharged are also interesting, because they show that whereas 5.4 per cent. of the second million men in the draft were found to have demonstrable venereal diseases as they came in from civil life, less than .25 per cent. were found to have it in demobilization, even though the treatment of some of those received from civil life had not yet been finished.

2. DISCHARGED SOLDIERS

Soldiers discharged before October 6, 1917, when the War Risk Insurance Act took effect, are entitled to pensions; but if death or total and permanent disability occurred on or after April 6, 1917, and up to February 12, 1918, even though no insurance had been taken out or applied for, the soldier was entitled to automatic insurance which would be payable during his life in monthly installments of $25 each, or in case of death before receiving 240 of such monthly installments, the remainder were to be payable to his widow or to other members of the family.

The epoch-making War Risk Insurance Act, which was intended to do away with the unfavorable effects of the pension system, provided for all disabled men discharged on or after October 6, 1917, compensation and treatment, besides the insurance which men were permitted to take at very low rates. The terms of compensation vary with the circumstances of the man as stated in the Act, and are now so well understood that they need not be considered in detail. For men with tuberculosis the right to treatment, which has not in all cases been so well understood, is especially important. The Act says: "The injured person shall be furnished by the United States with such reasonable governmental medical, surgical, and hospital services . . . as the Director may determine to be useful and reasonably necessary." As the Military and Naval hospitals were not available for civilians, the responsibility for this government hospital care seemed to be thrown primarily upon the Public Health Service; but because of its insufficient accommodations the War Risk Insurance Bureau found it necessary to place tuberculous patients needing treatment in various private sanatoria throughout the country under a per diem arrangement, though in many cases it permitted them to take the treatment at home. Many preferred to do this, but it seems clear that treatment at home is, as a rule, not so good as in a well conducted sanatorium.

Anticipating a very large number of tuberculosis patients, as well as many others of various kinds, legislation to provide additional facilities for the Public Health Service was promptly sought. After considerable discussion the Military Hospitals Act, Public No. 326, was passed on March 3, 1919, appropriating in all $9,050,000 to provide additional hos-

pitals, equipment, and services for the Public Health Service. This promises ample facilities so far as can now be determined, and as one provision of it empowered the Public Health Service to take over any Army hospitals which the War Department could release, the Public Health Service was able very promptly to secure seven such hospitals recently built in favorable locations and immediately available. The scarcity of doctors has hindered the Public Health Service somewhat in securing the necessary staff for all of these hospitals, but this difficulty is being met and the War Risk Insurance Bureau is expected to give the Public Health Service preference in placing men with tuberculosis for treatment. The hospital at Camp Sevier, Greenville, South Carolina, has been designated as the one to which all tuberculous discharged soldiers from this part of the country should be sent, and there were there, on May 26, 173 such patients.

The section in the original Act which required the War Risk Insurance Bureau to cut off the compensation where a man refused to take the treatment prescribed was repealed on June 27, 1918, so that the Bureau does not now have this means of control. Considerable difficulty has been experienced in having the men go to, or remain in, the sanatoria assigned, but as the Bureau still has the right to refuse to pay for treatment in case of disobedience, there ought to be no difficulty in securing adequate control if the matter is properly handled.

Before the passage of the Military Hospitals Act, on February 20, 1919, by Circular No. 98, the Surgeon General of the Army provided for the re-admission, if ordered by the War Risk Insurance Bureau, of discharged soldiers to any of the Army hospitals on the basis of actual cost of such care and treatment, amounting to about $1 per day. This provision has been taken advantage of to a very limited extent only, because the Public Health Service prefers to have the men sent to hospitals under its own charge. It has made every effort to facilitate this, and to encourage men entitled to compensation and treatment to make application for them, by issuing full directions as to the course to take and where to apply in Circular No. 140 of the Secretary of the Treasury, dated April 29, 1919.

All discharged soldiers who are entitled to compensation are also entitled, under the Vocational Rehabilitation Act which was passed on June 27, 1918, to vocational training and placement by the Federal Board for Vocational Education. The Federal Board has taken up this work earnestly, and has developed an organization with offices in charge of a District Vocational Officer in a principal city in each of the fourteen districts into which the country has been divided, in order that applications by disabled men may be conveniently made and their wants promptly attended to. It has also published considerable effective literature calculated to arouse the attention of disabled men and encourage them to make the most of themselves.

The subject will be discussed at length in another paper at this session, but it may be recorded here that since November 11 last, at the request of the Federal Board, Dr. H. A. Pattison, Medical Field Secretary of the

National Tuberculosis Association, has been working as Secretary of an Advisory Committee appointed by the National Tuberculosis Association to advise and assist the Federal Board in developing its plans for the care of discharged tuberculous soldiers.

On January 17 last, this Committee, at the invitation of the Federal Board, passed a resolution advising it to give occupational therapy and pre-vocational training in any sanatorium where there were 20 or more War Risk patients under treatment, of which there were then and have been since from three to ten. This the Federal Board has so far failed to do except in three places, to each of which a single instructor was finally sent about two months ago, giving as a reason that it has been unable to obtain the necessary instructors. A report from the North Carolina State Sanatorium speaks enthusiastically of the beneficial effect such training is having on the patients there, of whom there are 24, with classes numbering 52 members, in two-thirds of which the subject taught requires no particular expense for material or equipment. At the Hendricks Sanatorium at El Paso, where there are 40 soldiers under treatment, 28 men are taking the educational training, with an enrollment of 91 in classes of which none required much expense for supplies or equipment. Three instructors are now employed and the report as to the highly beneficial effect of the teaching on the men is emphatic. The Rutland Sanatorium states that it has 27 War Risk patients, of whom 25 are taking the training, the other two being too ill to do so. The total enrollment is 68, of whom 56 are in classes not requiring any special expense for equipment. Dr. Crane says the good effect, both mental and physical, of this training, cannot be exaggerated.

There is no apparent reason why the Federal Board should not be giving similar instruction at the sanatorium at Fort Stanton, where a careful study was made and recommendations approved by the officer in charge six months ago; at Camp Sevier, where the men have been asking for it, or at several other places where there are from 21 to 92 men, making up a total of nearly 500 men who are entitled to this training at the hands of the Federal Board and are not getting it.

It is true that the records of the War Risk Bureau are sadly behind, and that the number of awards for tuberculosis cases is not known, and that a complete statement of the number of tuberculous discharged soldiers in various sanatoria cannot be secured; but knowledge of the opportunities in these important places is readily obtainable, as it has been for months, and the responsibility for the failure to develop a teaching force which would give these unfortunate men the training which the Advisory Committee of this Association has recommended, and which would promote their recovery by keeping them contented, rests squarely on the Federal Board. The facts in regard to this are stated, not from any desire to criticize, but in the hope that a knowledge of them will be helpful to the disabled soldiers in the other places.

The number of tuberculous men recommended for training in various callings by the Federal Board up to April 17 last, the latest report obtain-

able, was stated to be 136, and 114 had been put in training. The relatively small number of these men makes the failure to provide training for so many men in sanatoria more difficult to understand.

3. DRAFT REJECTS

Men rejected by the local draft boards have no military status, and were returned to civil life after being found unfit for military service. They constitute, therefore, a part of the civil population of the country, but with this difference, that, because of having been brought temporarily into the light, the fact that they have tuberculosis became known to the Army authorities. Because of its interest in the general subject, and its desire to help all those suffering from this disease, the National Tuberculosis Association arranged in the latter part of 1918 with the Surgeon General's Office to copy in duplicate the names, addresses and notations as to the form of the disease for each of the men rejected by the local draft boards, from the beginning of the second draft or before. One copy of these cards to the number of 61,964 has been sent to the state tuberculosis association in each state, in order that the men may be followed up and given through the proper agencies such information and assistance as their cases require. The information as to the results thus far obtained from this effort is not yet very complete because it takes some time to visit so many men so widely scattered. In some of the larger cities, particularly in Chicago, considerable difficulty has been found in locating them. In Denver an investigation at 108 addresses out of 710 resulted in the discovery that most of the persons sought had moved away. In Kansas, in spite of very careful work, 45 per cent. of men rejected by the local draft boards were not found; but in Massachusetts the proportion of men who had left the state, died, or were unknown was less than 25 per cent., and 11 per cent. were reported by local boards of health to be non-tuberculous. In Kansas personal contact was made with 83 per cent. of the rejects who had remained in the state and 40 per cent. of those rejected by the Army surgeons. The results in these cases indicate that the work is well worth while, and as it is still going on throughout many of the other states good results ultimately are hoped for.

It is interesting to note that of the 69,935 men rejected for tuberculosis by the local draft boards the classification was,

Pulmonary tuberculosis	44,305	63.5 per cent.
Suspected tuberculosis and weak lungs	16,899	24.0 per cent.
Other forms of tuberculosis	8,731	12.5 per cent.
	69,935	

That the second item is relatively so large might indicate a lack of definiteness in the conclusions, and explain why in Massachusetts 11 per cent. of the rejects were later reported by local health boards to be non-tuberculous; but in general we must take the records as we find them.

The names of men rejected by the Army surgeons since the beginning

of the second draft have been received by the National Tuberculosis Association along with those of men discharged from camps and hospitals, and have been sent to the state boards of health, the state tuberculosis associations, and the Red Cross in each state, so that every effort has been made to reach these cases to the extent of more than 10,000 of those rejected by the Army surgeons.

Some effort has been made to include men so rejected by the Army surgeons on account of tuberculosis among those entitled to compensation, treatment and vocational training under the War Risk Insurance Act by claiming that every man inducted actually became a soldier from that time, so that the government was as much responsible for his future care as if the previously existing disability which the Army surgeons found, and for which they rejected him, had been contracted in the service. However much one might be inclined toward a liberal interpretation of the law in favor of men affected by tuberculosis, any construction which would entitle men so rejected to treatment and care for the remainder of their lives from the government would apply as well to those rejected by the Army surgeons for other causes, such as hernia, deafness or flat feet. As there were more than 200,000 men rejected in this way in all the drafts, of whom only a small fraction of probably not more than 2 per cent. were in any way injured physically by their experience in the draft before being rejected by the Army surgeons, and as an ultra-conservative estimate of the average amount needed to treat and care for these men would amount to not less than $2500 each, the possible sum required by the unnecessarily liberal interpretation of the law thus proposed would amount to about $500,000,000. Anyone who suggests such a distribution in favor of men who have suffered from the government nothing which entitles them to it is no friend of justice or of good government.

Proposed Change as to Basis for Vocational Training

In the Vocational Rehabilitation Act of June 27, 1918, the right of a discharged soldier to vocational training was based on his right to compensation, thus making only one record of the injury and the circumstances connected with it as entitling him to both compensation and vocational training.

This seemed quite proper as a simplification of the general procedure in caring for disabled soldiers; but, probably because the War Risk Insurance Bureau is so far behind in making its awards, a bill has already passed the Senate (S. 1213) changing and enlarging the basis for vocational training. This bill provides that every person enlisted, enrolled, drafted, inducted or appointed in the military or naval forces of the United States, including members of training camps, who, since April 7, 1917, has resigned or been discharged or furloughed therefrom under honorable conditions, having a disability incurred, increased, or aggravated while a member of such forces, or later developing a disability traceable in the opinion of the Board to service with such forces, and who, in the opinion of the Federal Board, is in need of vocational rehabilitation to overcome

the handicap of such disability, shall be furnished by the Board with such course of vocational rehabilitation as the Board shall prescribe and provide.

It further provides that the Board shall pay for the maintenance of such persons while taking the training not more than $75 per month for a single man, with the present legal additions for men who have dependents. This is not quite so large a payment as has already been recommended by the War Risk Insurance Bureau for compensation in cases which are entitled to it. As the opinion of the Federal Board in a matter of such importance must necessarily be based upon a careful medical examination, and on an investigation of the facts in the case similar to that required for the granting of compensation, this means a practical duplication of the examinations, investigations, and records needed for the same men. However much this may hasten results in some cases it is to be regretted that the government has not succeeded in making the same examination of the same wounds do for the same man for the benefits it offers him, instead of twice subjecting him to the trouble and delays necessarily incident to such a procedure, to say nothing of the great expense of this duplication.

The constant desire and purpose of the people to do ample justice to disabled soldiers, including those with tuberculosis, is apparent and most gratifying, and it is for agencies such as this Association to help in guiding its purpose towards the best results.

DISCUSSION ON PAPER BY MR. BALDWIN

Paul L. Benjamin, Washington: This subject has been so adequately covered by Mr. Baldwin that it is not necessary for me to do more that stress certain points, and to speak specifically of the part which the American Red Cross, through its Department of Civilian Relief, has been playing in meeting the problem of the tuberculous soldiers and those rejected by draft boards for that cause.

Mr. Baldwin informs us that 88,246, or 2.344 per cent. of all the men examined for military service, were unfitted for such service by reason of tuberculosis.

Much of the significance of these figures lies in our interpretation of them. I have a concrete head. I want to know the implication of these facts. Do they bring us to a sharper realization of the immensity of this problem? What is being done for these 88,000 men? What is the provision of the government? Of the states? Of the municipalities? What are we doing? And as a corollary to all this, how about the thousands, who by reason of their sex or age were not liable for military service, who are suffering from this disease? I am glad that Mr. Baldwin has given us such concrete information upon many of these points.

On a trip early this year through some of the southern states, I had a graphic interpretation of the situation presented by figures such as those given. In discussing the problem of the returned tuberculous soldier I

was informed that in three of the Gulf States there were only 300 beds available for tuberculosis patients while there are 1500 returned soldiers with that disease from those states alone, and that in one state, Alabama, a Negro with tuberculosis in order to receive sanatorium treatment had to commit a crime, since the only institution where he could obtain care was the State penitentiary. I feel, therefore, that we should scrutinize minutely the implications of the facts brought out by the war and take advantage of the flood-tide of interest in the disabled soldiers, pressing home those truths which we have long known.

Touching further upon the facts presented by Mr. Baldwin, Col. Roger Brooke, in charge of the Division of Tuberculosis of the Surgeon General's office, gave me figures for 80,198 of the 88,000 men spoken of above, tabulated by states. It is interesting to note that Arizona, New Mexico, California, and Colorado show the highest percentage of tuberculosis among the men examined, reaching the high figure 87.16 per cent. in the case of Arizona, while Montana, Nebraska, North Dakota, and Wyoming give the lowest percentage, all of them being under 19 per cent.

These figures might be depressing if there were not another side to the picture. One of the encouraging factors has been the enlightened policy of the Surgeon General's office in dealing with the tuberculous soldier. In former wars each man was considered principally a unit in a fighting machine. As soon as his effectiveness for active military service ceased he was scrapped, so far as the military organization was concerned. Under the present régime, however, all this was changed.

The Army regulations, issued by the Secretary of War in Bulletin No. 36, War Department, issued July 11, 1918, read, in part, as follows:

> Hereafter no member of the military service disabled in line of duty, even though not expected to return to duty, will be discharged from service until he has attained complete recovery or as complete recovery as it is to be expected that he will attain when the nature of his disability is considered.

It was natural, however, that the requests for discharge by the men themselves and their relatives and friends should lead to a great deal of pressure being brought upon the military authorities for their discharge. As a result of such pressure, the War Department, on December 31, 1918, issued a circular letter permitting the discharge of a man from Army hospitals in cases where friends could furnish satisfactory guarantee for the continuance of care and treatment after the discharge. This order made it possible for a patient to procure a discharge upon the presentation of the guarantee even though an investigation of the facts might show that satisfactory treatment could not be furnished by the family. As soon as this condition was brought to the attention of Col. Roger Brooke, he sent a letter to the commanding officers of the Army tuberculosis hospitals calling their attention to the fact in regard to discharges, and directing that as soon as the patient was received in a hospital a letter explaining fully the situation regarding him should be sent to his nearest of kin.

TUBERCULOSIS ALL

	Absolute Number	*Ratio*		*Absolute Number*	*Ratio*
Alabama	1337	25.79	Nevada	84	25.52
Alaska	59	48.44	New Hampshire	206	24.17
Arizona	723	87.16	New Jersey	2042	26.90
Arkansas	1174	27.50	New Mexico	862	84.26
California	4672	57.91	New York	8347	32.37
Colorado	1618	71.92	North Carolina	2071	37.40
Connecticut	1287	35.83	North Dakota	329	18.41
Delaware	101	19.99	Ohio	3729	26.11
Dis. of Columbia	284	24.61	Oklahoma	1406	23.14
Florida	586	24.30	Oregon	471	29.44
Georgia	1816	28.44	Pennsylvania	5250	25.95
Idaho	247	19.78	Rhode Island	607	41.86
Illinois	4986	27.80	South Carolina	917	23.27
Indiana	2172	30.38	South Dakota	435	20.94
Iowa	1401	20.43	Tennessee	2249	36.75
Kansas	920	23.95	Texas	3431	28.94
Kentucky	2554	39.97	Utah	224	19.04
Louisiana	1716	33.16	Vermont	287	34.11
Maine	725	36.57	Virginia	2109	37.91
Maryland	1789	48.07	Washington	1182	33.25
Massachusetts	2710	29.65	West Virginia	871	22.39
Michigan	2521	25.48	Wisconsin	1827	28.91
Minnesota	1563	21.73	Wyoming	114	17.18
Mississippi	1129	29.96	State not specified	1175	
Missouri	2790	32.58			
Montana	453	16.52	*Total*	80,198	
Nebraska	504	17.09			

PULMONARY TUBERCULOSIS, PLUS SUSPECTED TUBERCULOSIS

	Absolute Number	*Ratio*		*Absolute Number*	*Ratio*
Alabama	1192	22.99	Nevada	80	24.30
Alaska	53	43.51	New Hampshire	184	21.59
Arizona	691	83.30	New Jersey	1807	23.80
Arkansas	1067	24.99	New Mexico	826	80.74
California	4317	53.51	New York	7385	28.64
Colorado	1496	66.50	North Carolina	1841	33.25
Connecticut	1121	31.21	North Dakota	263	14.72
Delaware	86	17.02	Ohio	3229	22.61
Dis. of Columbia	248	21.49	Oklahoma	1228	20.21
Florida	538	22.31	Oregon	408	25.50
Georgia	1581	24.76	Pennsylvania	4637	22.92
Idaho	212	16.98	Rhode Island	532	36.69
Illinois	4403	24.55	South Carolina	818	20.76
Indiana	1589	26.00	South Dakota	383	18.44
Iowa	1219	17.78	Tennessee	1970	32.29
Kansas	841	21.89	Texas	3115	26.27
Kentucky	2243	35.10	Utah	186	15.81
Louisiana	1596	30.84	Vermont	252	29.95
Maine	648	32.69	Virginia	1816	32.64
Maryland	1608	43.21	Washington	1031	29.00
Massachusetts	2321	25.39	West Virginia	756	19.43
Michigan	2274	22.98	Wisconsin	1561	24.70
Minnesota	1291	17.95	Wyoming	99	14.92
Mississippi	1011	26.83	State not specified	1086	
Missouri	2525	29.49			
Montana	369	13.46	*Total*	72,750	
Nebraska	447	15.16			

Ratios based on entire number of Class 1 men.

Later, in order that commanding officers might have definite facts as to the ability of a man's family to provide proper treatment, on April 3, 1919, he sent a letter to the commanding officers recommending that they investigate through Home Service Sections of the Red Cross, each application for the discharge of the soldier. As a result of this letter, the Home Service Sections have been making such investigation upon the request of commanding officers. As a result in a large number of instances Home Service workers have been able to convince families that they should not only not urge the discharge of their men from Army hospitals, but should do everything in their power to encourage them to continue under treatment. They have thus been a real contributing factor in lengthening the stay of men in army tuberculosis hospitals. A number of interesting cases have been called to my attention in which the family had asked for the discharge, but when the whole situation was explained to them by the Red Cross visitor, they were only too glad to reverse this request and to write both the commanding officer and the man advising that this request be withdrawn, and that treatment be continued. In this connection, it may be interesting to give one of the reports made by a Home Service secretary upon a request for an investigation made by a commanding officer:

HOME CIRCUMSTANCES OF PRIVATE
Illinois

1. Does the soldier's family understand:
   a. That he has tuberculosis (consumption)? Yes.
   b. That he needs special care and treatment? Yes.
   c. That such treatment, to be effectual, must be prolonged often from one to two years? Yes.
   d. That such treatment is usually of considerable expense (ten to twenty-five dollars a week)? Yes.
   e. That the outcome of the disease in a great measure depends on proper treatment? Yes.
   f. That sanatorium or institutional treatment has been more effective than home treatment? Yes.
2. Is the soldier or are the soldier's relatives financially able to give proper and suitable treatment? No.
3. Do the soldier's relatives or friends state that such proper and suitable treatment will be given? (Could not give proper treatment at home.)
4. Do the soldier's relatives or friends desire the soldier's discharge from this hospital? No; think it best for him to stay in some suitable hospital.
5. State from whom the above information was obtained. Father, Illinois.
6. Does the investigator of this case personally feel that the soldier if discharged will receive proper and suitable treatment? No.
7. Additional information: Relatives not able to give proper care to soldier. They agree to write to him and urge him to stay till recovered. The family surroundings are not what they should be for a case of that kind, and the climate here not good for him.

(Signed) M. D.

Chairman, Home Service, A. R. C.,
Illinois.

Definite instructions were issued by the Department of Civilian Relief

at Headquarters to its Home Service Section upon this matter of which I should like to quote a sentence:

It is clear duty of Home Service Sections in individual cases and through general publicity to combat efforts for the premature and inadvisable discharge of disabled men from the Army hospitals.

DISCHARGED SOLDIERS

Before the present policy of retaining men with tuberculosis in service for treatment went into effect, many men, of course, were discharged with this disease. Since Mr. Baldwin has given us accurate figures as to their number, it is not necessary to give further statistics here. These men are compensable and are entitled to treatment by the Bureau of War Risk Insurance. Unfortunately, many of them as yet have not made application for compensation, and are not receiving sanatorium treatment. It is to this class that the various tuberculosis associations and the Red Cross have a decided responsibility. Although various agreements have been made by the Division offices of the Red Cross and state tuberculosis associations as regards the discharged tuberculous men, it is the general policy of the Red Cross that contact with these men should be made first by the tuberculosis association or the state board of health, and then by the Home Service Section of the Red Cross. Obviously, where the state tuberculosis association or the state board of health is not adequately equipped to deal with this problem, it is necessary for the Red Cross to move up into second or first place, since it has accepted the responsibility of doing everything possible for the discharged soldier and sailor and his family. Increasing measures should be taken to see that all these discharged men who are entitled to treatment by the Bureau of War Risk Insurance should be informed of that fact.

This problem of the discharged, tuberculous man presents some other salient factors. In the first place there has been an unwillingness on the part of many men to remain in a sanatorium, or if undergoing treatment in an institution located in a climate such as that of Colorado, they have been reluctant to be transferred to an institution elsewhere. However, it is hoped that recent action will help to make the men contented. As a result of a request from Surgeon General Blue the Red Cross, through its Department of Civilian Relief, will undertake medical social service in the hospitals of the Public Health Service. Steps have already been taken to institute it in many of these hospitals.

Another factor, and one of the most important in persuading men to continue treatment is some form of occupational therapy or vocational training. Captain North will develop this at length in his charming and dramatic manner.

Secondly, there is need for increasing the compensation allowed for the tuberculous. At present, the compensation for total disability is only thirty dollars a month. I understand, however, that it is possible that Congress will increase this to one hundred dollars.

As touching directly the problem of the discharged, tuberculous soldier, a new program of the United States Public Health Service has

import. The United States has been divided geographically into fourteen Divisions, a representative of the Service being appointed to have general supervision over each of these Divisions. At the present time the following officers have been appointed for the following territory:

Dr. W. W. King, Maine, Vermont, New Hampshire, Massachusetts and Rhode Island.

Dr. F. C. Smith, for New York, New Jersey, Connecticut.

Dr. J. A. Watkins, North Carolina, South Carolina, Tennessee, Georgia, Florida.

Dr. C. H. Waring, Louisiana, Alabama and Mississippi.

Dr. Dana E. Robinson, Indiana, Ohio and Kentucky.

Dr. Bert W. Caldwell, Illinois, Wisconsin, Michigan.

Dr. William Charles Witts, Nebraska, Iowa, Missouri and Kansas.

Dr. H. M. Bracken, Minnesota, North Dakota, South Dakota, Montana.

Dr. E. E. Cable, Washington, Oregon, Idaho.

Dr. R. D. Drinkwater, Colorado, Utah, Wyoming.

Appointment made for California, Nevada and Arizona.

Appointment made for Arkansas, Oklahoma and Texas.

Under circular letters 140, 159 and 168, these officers have been given wide powers in dealing with the problem of the sick and disabled soldier, sailor and marine. They are empowered to appoint representatives of the Public Health Service in cities and other communities throughout their states. In the larger communities, full time, paid officers of the Service will probably be appointed, and in the smallest communities contract physicians secured. I understand, also, that these officers can represent the Bureau of War Risk Insurance to a certain extent. Hospitals and stations of the Public Health Service, as you probably know, are authorized to give necessary treatment and care to any sick and disabled soldier, sailor or marine. Emergency care may also be given by these hospitals to such men without referring the matter to the Bureau of War Risk Insurance in Washington in case there is presumptive evidence that the man is a compensable case.

Until very recently, the Red Cross has not accepted any responsibility toward draft rejects with tuberculosis, since its services were largely limited to soldiers, sailors, and their families. However, now that it is embarking upon its peace-time program, it will be possible under certain conditions for Home Service Sections to participate in this field. Although it is not my province to discuss this matter, I might state some of the conditions which govern Home Service Sections in their desire to extend their work to civilians and to engage in general community activities. In the first place, such work should in no wise conflict with the effort of any other recognized organization already in the field. In the second place, when any Home Service Section desires to enter upon a peace-time program it is required to submit its request to the Division Manager and the Division Director of Civilian Relief who will then decide whether or not the request should be granted.

In conclusion, I am reminded of the story of the three Negroes who were

fishing in a boat anchored off the shore. The sun was hot; soon all three darkies were fast asleep. Meanwhile, the tide came up, and carried the boat far adrift. With a start Sambo woke, and looked around, "Alexander," he cried, "Alexander,—wake up, we done gone, we ain't here no mo!" So the war has brought a new emphasis to the eradication of tuberculosis. Let's all join hands in this great crusade.

Arthur J. Strawson, Washington: I think we must absolutely agree with Colonel Bushnell that the outstanding thing about this tuberculosis gain in connection with the war has been the vigorous and splendid way that the government and Surgeon General have undertaken and put the thing over. I wish that I could share with Mr. Baldwin his belief that no particular harm is coming to the soldiers who are now in the tuberculosis sanatoria of the government from the action of the Order 188 of the Surgeon General's office. This Order 188, provided, as you know, that men may be discharged from the service if their relatives or friends will indicate that they are able and willing to provide specialized care for them. Although the commanding officer of the sanatorium does investigate this, and although the man's father does say that he is willing to provide the specialized care, what does it mean? It means, perhaps that he is worth $5000 or $10,000, but it does not mean at all that that soldier is going to get sanatorium treatment. For when a man is discharged from the service and becomes a civilian he is much like other civilians, and if he has tuberculosis it is just about as hard to convince him that he ought to go to a sanatorium as it is to convince other civilians. Therefore, the great opportunity for the tuberculous soldiers now in the army sanatoria is to keep them there until they are cured, or until everything possible is done for them. What is the answer? In the first place the office of the Surgeon General is trying to do all within its power to retain these tuberculosis patients. In the second place, the Red Cross, through its Home Service agencies within those hospitals, is trying also to convince the men that their best interest lies in finishing the treatment where they are; and in the next place, it is true that the tuberculosis agencies of the country quite generally are coöperating with the Home Service Sections of the Red Cross. It is, I think, particularly the responsibility of the tuberculosis agency to use any influence that it may have with the family that is trying to get its boy to come home, to convert such family from the error of its way. Letters to the tuberculous soldiers ought not to encourage him in his restlessness, but ought to encourage him to bide his time and take the cure in the sanatorium; sweethearts and friends should also be convinced that their letters should bear that message to the boy, and that they should not create anxiety for his speedy return home. That is a very practical and very simple way in which our tuberculosis agencies can coöperate with the Red Cross in helping to hold these men, these 6000 tuberculous soldiers in the army hospitals because when the affidavits asking discharge and guaranteeing care come in, the commander seems like a cruel-hearted man if he then refuses to send a patient home.

An extremely helpful and practical suggestion came from Col. George

E. Bushnell whom, I presume, the Surgeon General sent to visit tuberculosis hospitals throughout the country (at least I met him at the Fort Bayard, New Mexico, Sanatorium). Here is the suggestion he gave to the commanders of those hospitals. "When these affidavits come to you bear in mind, in making the decision that if the man is discharged, he is going to get the equivalent of $35 a week sanatorium care, and do not discharge as many patients as you have been in the habit of discharging because we are going to hold this higher standard." Of course, we cannot quite reconcile the fact that the sanatorium treatment paid for by the War Risk Bureau is only some $17.50 a week, while this new standard is $35 a week, but it is a move in the right direction and it ought to be encouraged.

Otto F. Bradley, Minneapolis: Mr. Baldwin has covered the subject very comprehensively. I want to add to his appeal for the care of the disabled soldier, however, as strong an appeal for the draft reject, who is quite as much of a problem—in fact according to his figures, about six times the problem of the returned soldier.

Mr. Baldwin made the statement that the man who would ask that the draft reject who had never been in the service be cared for at the expense of the government, was no friend of fair play and justice. Should there be such a difference in our regard for the men subject to military duty who were discovered to be tuberculous on the eve of entering service and those who were found tuberculous the morning after? I do not think so. But I wish to suggest that we look at it from another viewpoint than that of the right of the consumptive.

Mr. Baldwin's statement is along the line of reasoning on which are based laws providing public care for a consumptive only after he has been a resident in the community for at least one year.

Without drawing conclusions which may be unsafe without making qualifications, for which the time is lacking, I merely wish to suggest that we quit regarding the public care of consumptives solely as the right of the consumptive as a citizen or a soldier to care, and that we begin to recognize in our laws the right of the community to protection from the consumptive. It may be that the federal government is not the proper agency; it may be that it should not be done as a post war measure, but certainly the draft reject who as yet hasn't several great government agencies competing for the privilege of taking care of him, should be cared for, if not by his right as a subject of military induction or as a citizen, because of the right of the general public to protection against the spread of the disease.

The treasure mine of information revealed by draft examinations should not be thrown away or wasted. It should be utilized for the benefit of the public as well as the individual, and the public should stand ready, where necessary, to bear the expense.

OCCUPATIONAL THERAPY AND PREVOCATIONAL TRAINING FOR SOLDIERS ABOUT TO BE DISCHARGED

By CAPT. SAMUEL M. NORTH, S.C.

Oteen, N. C.

SUMMARY

I. Differences between the public attitude toward the orthopedic and the tuberculous soldier.

II. Differences between their Army treatment—Ft. McHenry and Oteen.

III. Organization and administration of reconstruction at Oteen.

IV. Outstanding feature the psychic one—the insidious characteristic tuberculous psychosis.

V. The medical adviser.

VI. Lessons from the Army experience:

The Army must settle down to a serious scientific study, based on the experience acquired in the tuberculosis hospitals, of the values and limitations of occupational therapy for tuberculous soldiers, and must thus set the example for the medical profession at large, exactly as its psychological work is doing for the public school men of the country.

I. I deem it proper to begin any discussion of reconstruction work with tuberculous soldiers by inviting your attention first to the striking differences between their situation and that of the orthopedic soldier. The latter is constantly in the public eye. He bears the outward and visible signs of his inward and spiritual devotion to the welfare of mankind. The methods—mechanical, surgical, and medical,—of treating him have been, to the layman, spectacular in their application and almost marvelous in their general efficiency. Then, too, the orthopedic is, except as respects his wounds, a healthy man. He can do a man's daily stint of work in learning to reëducate himself. He is able to work at his old trade, at a new one, or at some academic study for six or eight hours a day, and is under no hazard of losing interest from short hours or interrupted effort at his lathe, or printing press, or radio instrument, or automobile shop, or books, or typewriter. He is, in short, a healthy man merely temporarily handicapped and has every expectation of resuming at a definite time his place in the world as an independent economic factor.

How different in every respect, except patriotic devotion, is the situation of the tuberculous soldier! Bearing no outward traumatic mark like his orthopedic brother; winnowed out, often before he could get even to the point of embarkation; sent back to a tuberculosis hospital for Army

treatment—rest, food, exercise, diversion; permitted to work or study but two or three hours a day and sent to bed for two hours early in the afternoon just when the orthopedic man is hastening back to his books or his shop or his machine; put to bed early at night; watched, tested, tended every hour—and all this usually in hospitals remote from large cities. How much less spectacular and how much more deserving of our best continuous efforts is this victim of the world's greatest plague, and how severely limited in number are the fields of reëducation in which he can be trained! How tedious and, to him, how protracted the cure! Moreover, the orthopedic will relatively soon be restored to civil life and economic position, but the tuberculous soldier we shall have with us as long as we have an Army.

II. It is not my purpose to differentiate between the Army and the civilian treatment of tuberculosis; such an exposition would be gratuitous in this company. But I do wish to call attention to the great variety of occupations open to the orthopedic and to the paucity of vocations for which the tuberculous man can be retrained. There is practically no limit to the outlook of the orthopedic man. By means of the Bowler hook and of the marvelously ingenious leg attachments, he is not virtually but actually able after a period of practice to take up any work that normal men may follow. There is no question here of indoor versus outdoor work, of light versus heavy lifting, of factory conditions versus outdoor work; of acting, for instance, as chauffeur versus doing gas engine repairing. The orthopedic man is on his way to practically full restoration to his former calling or to a new one of his own choosing. The tuberculous man, on the contrary, if he is to live at all as a self-respecting, self-supporting member of society must re-adapt himself to occupations in most cases entirely foreign to those in learning which he has spent his formative years. In fine, outdoor work is the first consideration, for most tuberculosis cases, and it is a matter of commonest observation that the more intricate and highly skilled trades are not pursued outdoors.

Printing, jewelry work, engraving, high-class accounting, fine cabinet making, typewriting and stenography, even shoe repairing and tailoring, are taboo for the tuberculous man unless—which is so rarely the case—he has as an employee, absolute, control of shop conditions of hygiene and ventilation. This difference may be summarized by the statement that in the large orthopedic hospitals like, say, Fort McHenry (United States Army General Hospital No. 2) the reconstruction work shops simulate, and in many respects are, a great, busy, buzzing trade school where the value of the product turned out is no mean sum; but the shops of the tuberculosis hospital, say, for instance, the one where the present speaker works, are strictly limited in kinds of work offered, in the number of patients far enough advanced in their cure to learn the various trades offered, and in the money value of their output.

Another and no less important feature of the reconstruction work in tuberculosis hospitals lies in the fact that they are nearly twice as expensive to conduct as are the orthopedic hospitals. Since the patients are forbidden to work more than from two to three hours (in the forenoon),

it will be readily seen that there is a double overhead—equipment, materials of instruction, and personnel. In orthopedic hospitals, the material, equipment, and personnel can be utilized for at least two and sometimes three groups of soldiers daily; but in the tuberculosis hospitals the patient soldier has rest hours, i.e., regularly undresses and goes to bed between one and three daily. Only a negligible number can and do return to the shops or schools by half past three for a further hour of work or study.

III. The reconstruction work conducted at Oteen is organized under four general divisions: (a) ward and bedside work conducted by the reconstruction aides, of whom there are 30, directed by a supervisor of aides, and three head aides; (b) a school carrying principally academic branches, enrolling between 300 and 400 men; (c) shops where mechanical trades are pursued; and (d) agricultural and horticultural care of the hospital grounds.

To consider these seriatim: The list of projects that can be carried in the wards and in bed by tuberculous patients would seem to be the same as those carried by orthopedics, but a little reflection will show that this is not the case. It is true that the tuberculous man has the use of both hands and feet and does not need devices for the redevelopment of musculature; but it must always be borne in mind that in his case no strain should be placed on the muscles or nervous system, as such strain may readily produce hemorrhage or a temperature arising from nervous tension owing to concentration on prolonged work. Therefore, a bedside problem or a ward problem must meet the following very narrow limitations: It must be at once interesting of itself, simple of execution, attractive in color or design, easily taken up and, if necessary, as easily laid aside to be preserved indefinitely. It must involve no noise, dirt, or heavy machinery. Moreover, a complex problem of absorbing interest involving immediate completion may easily tempt a man beyond his strength with unfortunate lasting results. This is the answer to all such as complain that a good deal of our ward and bedside work is not "a man's job"; and it remains yet for them to make their case by suggesting some lines of activity that meet these limitations and are at the same time "a man's job." It may as well be said here that at this stage of his progress, as will be seen later, the problem is a psychic one. Textile work, therefore, in cord, wool, or mercerized cottons, knotted, tied, or woven gives excellent results; rake knitting, colonial mat weaving, bead work, weaving on small specially-designed looms and card board are excellent problems for this stage of convalescence, as are also small basketry—especially when sewed—clay modeling, block printing, and whittling small objects. The three last named, however, are untidy and must be carefully handled. All these are going forward at Oteen. The ward patients not confined to bed are required as far as possible to work out of doors on the open decks. The necessary qualifications of the projects which are carried in the wards and at the bedsides have been summarized as follows:

1. Must aid to recover, (a) indirect; (b) direct.
2. Must be adapted to meet conditions.
3. Must be suited to ward conditions.

4. Should be a man's task or lead to one.
5. Must be easily presented.
6. Must be objective.
7. Must be intermittent.
8. Must appeal to a number of people.
9. Material must be available.
10. Should lead out to shops or school.

1. Colonial mats.
2. Macrame Cord { belts, purses, lanards, leashes, hat cords
3. Rake knitting { cord, wool, mercerized cotton
4. Card-Board { purses, bags, caps, hat bands, belts, scarfs
5. Weaving-loom { spiral puttees, cravats, hat bands, rag rugs, pillow tops
6. Sock machines
Bead work { fobs, chains
Wood work—toy making (see below)
Toy Making { 1. Wood { circus, animals, character dolls, camouflage ships; 2. Tin cans { coal wagons, army trucks, aeroplanes
Card-board { waste basket, lamp shade, desk set, boxes
Basketry { local materials { honey suckle, pine needles, willow, oak splint; reed; raffia
Bowl and various sorts of pottery
Clay (design work—medallion)

The following figures, too, are of interest and importance in connection with this discussion:

Eighteen thousand out of 70,000 patients were taking work (reconstruction) in United States hospitals in March, 1919.

Fifty per cent. of hospital population have been available for reconstruction work.

Oteen ranks fourth of *all* hospitals doing reconstruction work.

In March there were 2321 officers, non-commissioned officers, and aides doing reconstruction work.

The number of patients doing reconstruction work in March was 73,319.

The total number of patients doing work since we began is 271,000.

Eighty per cent. of all efforts are indirectly curative, or psychic.

Small tables on the porches fitted with small vices, clamps, or bench hooks furnish the work shops where elementary wood work or metal work, such as tin-can toy making, is conducted. Reed, willow, splint, and pine-needle basketry, book binding, card board work, leather work, heavier whittling, and carving, and loom weaving either hand or foot, are deck projects at Oteen and are given in the ambulatory wards with increasing emphasis on skilled and pre-vocational training. For the still heavier work in metal, clay, wood, or textiles where space, large machinery, noise, and dirt are necessary, a work shop is utilized.

When men are able to leave the wards they conduct the heavier proj-

ects under the immediate direction of the aides in a large warehouse which has been fitted up as an aides' work shop and which is entirely different from the curative work shop where the large power machines are installed. A second large building houses the school, where the subjects range from teaching of illiterates reading and writing to the mathematics connected with surveying. The curative work shops proper are fitted with power machinery for wood working, with printing outfit, with a specially devised dust-removing shoe repairing apparatus, with a home-made switch board for instructing men in switch board tending, with a telephone switch board; and at various buildings on the grounds are conducted classes in photography, wireless, and agricultural and horticultural work.

This somewhat inadequate outline brings us up to a consideration of our main topic, occupational or pre-vocational training for soldiers about to be discharged. It is the conviction of the speaker and of his qualified professional assistants that the paramount value of the reconstruction service in the treatment of tuberculous patients is the psychic one. This work means a great deal more than is implied in the word diversional, a term very loosely used in reconstruction circles. It is not, accordingly, to be understood that the reconstruction service for the tuberculous limits itself to diversional projects. As a matter of fact, a great deal of the work is pre-vocational, and some of it actually fully vocational. There are, however, few activities which can be regarded in this latter class because the limitations imposed by the patients' physical condition are of such nature as to forbid either strong bodily exertion on the one hand or preparation for indoor occupations on the other. If the shop conditions under which the patient is likely to work, it is repeated, could be controlled, our men could be prepared for a great many more actual vocations than, unfortunately, is the case. But their malady limits their futures so severely that the callings for which they may be prepared while in the hospital are relatively few.

IV. For the reason stated it is repeated that the outstanding function, although not the only one, of the reconstruction service in tuberculous hospitals is so to keep the man's mind occupied in useful directions that his cure may proceed more rapidly. This, of course, does not mean that the opportunities afforded in many directions are merely diversional, but it does mean that in many of these directions, owing principally to the fact that the man's training is limited to not more than three hours a day, his activities must be principally pre-vocational and that his future and complete training for a trade or other vocation will have to be completed after his discharge from the hospital as an arrested, and later as a cured case. It is pleasant, however, to state that the occupations for which men *are* fully prepared at this hospital are automobile driving, including care of automobiles; automobile repairing, except such as involves heavy lifting and straining; outdoor sign painting; outdoor photography; land surveying; radio work, land and marine; typewriting and stenography; composing and press work; switch board tending; carpentry. The more important pre-vocational subjects are mechanical draw-

ing, free-hand drawing, bee keeping (which bids fair in some cases to be fully vocational), agricultural and horticultural (landscape) work, and a number of other subjects regarding which no clear line of demarcation can be drawn as between vocational and pre-vocational values.

V. It will be noted that up to this point nothing has been said of the medical treatment of tuberculosis, but all conclusions that have been stated have been based upon counsel which in turn has rested upon careful supervision given the activities of this organization by the regularly appointed medical officer, Captain David Townsend, M.C., who is known as "Medical Adviser to the Reconstruction Department" and who has practically grown up with the treatment, both civilian and Army. This gathering might as well understand for once and all that any claims made by serious enthusiasts, or well-intentioned philanthropists, or medical sciolists that tuberculous men can be trained fully for new vocations while in hospitals are untenable and entirely unsupported by any generalizations from the present available data, except in those cases where it is possible to retain the individual in the hospital for a sufficiently long time. In other words, such statements are specific ones and apply only to particular cases which, in turn are dependent upon ability of the patient—usually his financial ability—to remain under care for a sufficient length of time to be fully retrained vocationally. And since the present situation in the army is what this conference is facing, it ought also to be recognized that the present army is for the most part a volunteer army—not at all the old, or let us hope, the future regular establishment; and that the men of the present army now under treatment are naturally keen to get home and just as naturally utilizing every possible device to accomplish this end. It cannot be too emphatically stated that the primary means of treatment for tuberculosis is medical and that reconstruction is simply and solely medicine's hand-maiden and co-worker, and that the strong weight of opinion is to the effect that the principal direction reconstruction should take for the tuberculous, in the army hospitals at least, is the psychic one. If reconstruction as a by-product attains vocational training for the patient, why then we have so much to the clear good; but its principal business is so to occupy the patient's mind that his cure can proceed more rapidly.

DISCUSSION ON PAPER BY CAPTAIN NORTH

Dr. David R. Lyman, Wallingford, Conn.: I think of all things that have been said, the one that has interested me most in Captain North's paper is the way the army picked out the one thing they could do in the limited time at their disposal. That was to give the patient the viewpoint that would tide him past the first trying period of his cure and pass him on back to the rest of us with just a little different viewpoint, with his courage braced up, with his grip on himself again, and well over the shock (I do not know how many of you have been told that you have tuberculosis, but you feel as though somebody had just knocked you down). That is the thing the army has done in their vocational work down

there, and they have done it beautifully. I think we can apply this to our civilian work where sometimes we cannot give people complete vocational training and where very often it is not necessary. This new idea they have given us can be applied in a small way to almost any of our sanatoria, without a very great expense, as a new way to get in close to our patient, get his confidence, get a grip on him, and fix his eyes on the future ahead of him and aid in convincing him that life is really worth living and really worth fighting for.

Dr. L. B. McBrayer, Sanatorium, N. C.: There was one thing said this afternoon that I want to challenge and that was in regard to draft rejects. It was to the effect that anyone who proposed that the government should take care of the draft rejects as it is caring for the discharged soldiers had a very poor sense of justice. Personally, I am of the opinion that the draft reject has as much claim on the government as the man who got on the train and went to the camp and was sent back within the next few days. The one, I think, did as much as the other, but that is not the point I want to make, and that is that the government is a government of the draft rejects and of the civilians just as it is of the soldiers. The government,—state, county, municipal and national—should take care of the draft rejects, give them proper treatment and training the same as it is doing for the soldiers. Now it may be that the War Risk Insurance Bureau and the other regulations of the government do not provide for this treatment at this time; I would agree to a statement of that kind. But it ought to, and I believe if we go after them the national government would make an appropriation at this session of Congress to coöperate with the states and counties and cities in the treatment and training of these draft rejects and our other civilian population, and I hope we will do it.

I want to say also that I am interested deeply in this vocational therapy. I have seen Captain North's work at first-hand, and while with his eloquent language he pictures his work as well as it could be pictured in words, no one can realize from the mere description the splendid work that he and his force are doing with the patients at Oteen.

THE PROGRAM OF THE FEDERAL BOARD FOR VOCATIONAL EDUCATION

By H. A. PATTISON, M.D.
New York

The lot of the crippled victims of the world's wars has always constituted a record of injustice, neglect and waste. Pensions when granted by careless or ungrateful governments were often appropriated from excess revenues; and there were seldom any adequate amounts left after the payment of other governmental obligations. Consequently the soldiers were reduced to a shameful condition of beggary. Where asylum was provided, the discipline was so rigorous and the provision so miserable that inmates generally preferred to beg or depend upon other sources of charitable aid than remain in such surroundings.

A notable exception, however, has been the United States, which has been in advance of other countries in providing liberal pensions and soldiers' homes. These homes, nevertheless, have not been ideal. They have offered comfortable asylum but not much more. Little effort was made to accomplish vocational rehabilitation.

The World War has ushered in a new era for the victims of war, whether by wounds, accidents or disease. Only in recent years have there been any serious attempts to provide training in the trades and professions for the crippled. Now every country that has been at war has introduced some scheme of restoration. The enormous loss of man-power, coupled with stimulated and advanced humanitarian instincts, has demanded that something be done to make use of every latent talent that the handicapped soldier possesses, to restore him to a self-respecting and self-supporting place in the community.

"There are no cripples now, except those crippled in mind," said a man with two artificial legs, at a supper given recently for cripples. Certainly there need be few actually crippled so far as earning power is concerned if our soldiers avail themselves of the new opportunities offered them.

Again, the United States is the leader of them all in the scope and generosity of its program. Restoration begins, of course in the Army hospitals. The remarkable achievements of the Medical Department of the Army will be described in other papers before this Association. The policy has been to continue the treatment in Army hospitals until the man shall have reached the maximum physical and functional improvement that is possible, consistent with the nature of the disability. Occupational therapy or curative work has become an important feature of treatment. Beginning with ward occupations under the direction of women reconstruction aides, the soldier, as soon as he is physically able,

is given shop or class-room work. This is in the nature of pre-vocational training, an introduction to a trade or profession. When ready for discharge, the Federal Board for Vocational Education takes him in charge for full vocational training, if the nature of his disability requires that he be trained for a new occupation or given further proficiency in the occupation he followed before entering the service.

The Federal Board for Vocational Education was created in February, 1917, to coöperate with the states in providing vocational education in public schools, adapting educational facilities to the needs of those who must prepare to take up the commoner wage-earning pursuits in agriculture, industry or commerce. Within ten months every one of the forty-eight states availed itself of the opportunities offered through Federal coöperation. The declaration of war found an organization at hand for the emergency training of conscripted men for war occupations. In coöperation with the War Department emergency training classes were organized in public schools throughout the country, and courses of study devised. The total enrollment in war time training courses was 35,754.

On June 27, 1918, Congress passed the Vocational Rehabilitation Act, charging the Federal Board with the responsibility for training and placement of soldiers, sailors and marines after their discharge from military and naval hospitals. As now constituted, the Board has three divisions:

(1) The Division of Vocational Education.

(2) The Division of Rehabilitation.

(3) The Division of Research.

The Division of Rehabilitation has undergone great expansion as the United States entered more and more vigorously into the campaign against the Central Powers and as the stream of disabled men has been directed homeward since the signing of the armistice. There are now fourteen large district offices and seven sub-offices in twenty-one of the largest cities of the country. There are 1349 employees in the central and district offices of the Division. These include administrative officers, field men and clerical forces. Central Office has been compelled to occupy successively three buildings within the year to gain room for growth. It was believed that the present quarters would be ample to care for all the business of the Board, but the Vocational Education Division has been forced out and a still larger building is being sought. Several of the District offices have likewise been compelled to move two and three times.

Added to these difficulties was the task of finding, during an unexampled period of demand for all kinds of war workers, suitable men for rehabilitation work, which included organizers, vocational advisers, placement officers, statisticians, research workers, medical examiners, etc. Some weeks ago the Director told me that the Board had suffered nearly all the infantile diseases that any young organization may be subject to, but that now all that is needed for the fulfillment of its obligations is the perfecting of internal organization.

Under the existing rehabilitation act, every person who is disabled under circumstances entitling him, after discharge from the military or

naval forces of the United States, to compensation under the War Risk Insurance Act, and who in the opinion of the Federal Board is unable to carry on a gainful occupation, to resume his former occupation, or to enter upon some other occupation, or having resumed or entered upon such occupation, is unable to continue the same successfully, shall be furnished with such course of vocational rehabilitation as the Board shall prescribe and provide. The Board is also charged with the placement in industry of handicapped discharged soldiers, sailors and marines and with follow-up service to insure their complete reëstablishment in civil life.

There were on May 24, 108,540 reported cases of disability in the files of the Federal Board. The reports have come from the Bureau of War Risk Insurance, the Department of Labor, the Red Cross, from hospitals, from the men direct and from other miscellaneous agencies.

The vocational advisers of the Board have personally interviewed and made vocational surveys of 69,960. The cases reported to the Central Office for approval of prescribed courses of training number 10,708. Of these 5254 have been approved. The reason given for the large number not yet approved is that nearly all are pending decision by the Bureau of War Risk Insurance as to compensability. The Board cannot put men in training unless they are declared compensable. Four hundred sixty-one (461), cases have been disapproved for training. Two thousand nine hundred forty-four (2944), have actually begun training. The others, who have been approved, are either not yet medically fit to begin training or are waiting for fall courses of study.

The courses range in length from six weeks to four years, though approval is restricted to one year. Renewals for longer periods must be arranged for annually. Men have already entered more than 200 institutions of various kinds. Of 2524 cases in training, the following report is made by the Department of Records and Returns:

REPORT I.
SECTION I. June 5, 1919.

TRADES AND OCCUPATIONS FOR WHICH MEN ARE BEING TRAINED
TO JUNE 1, 1919

Accounting	55	Cabinet Making	10
Agriculture	339	Civil Engineering	19
Auto Mechanics	150	Chemistry	15
Academic	30	Chemical Engineering	2
Architecture	32	Commercial Art	13
Americanization	8	Carpentry	16
Architectural Drawing	9	Concrete Construction	2
Advertising	23	Dye Cutting	1
Assaying	12	Dramatics	2
Auto Instruction	15	Drafting	5
Artificial Limb Making	2	Elementary Courses	99
Bee Culture	3	Electrical Course	160
Business Course	165	Economics	6
Business Organization	44	Engineering	16
Barber	6	2 Courses in English	40
Braille	6	English	43
Baking	6	Engraving	1
Bookkeeping	44	Embalming	7
Commercial Course	295	Foreign Trade	4

Forestry	8	Photography	29
Fisheries	3	Preparatory Course	45
Flour Milling	1	Physical Training	1
Gardening	16	Plumbing	18
Gas Engineering	13	Phonograph Repairing	1
Garment Cutting	3	Piano Tuning	1
Geology	3	Placement Training	2
Horticulture	13	Pattern Making	3
Horology	1	Printing	7
High School Course	20	Proof Reading	2
Illustrating	5	Radio Operating	2
Interior Decorating	1	Salesmanship	47
Industrial Art	1	Stationary Engineer	31
Jewelry Manufacturing	5	Secretarial Course	27
Journalism	1	Surgical Dentistry	1
Life Drawing	2	Sheet Metal Work	14
Lip Reading	12	Stock Raising	2
Landscape Gardening	18	Steam Engineering	13
Law	42	Switchboard Operating	2
Languages	4	Sculpturing	1
Linotype Operation	18	Shoe Making	13
Meat Inspector	4	Science	2
Mining Engineer	5	Typewriting	2
Medical Course	32	Teachers' Training Course	6
Mechanical Course	3	Typewriter Repairing	3
Mechanical Drafting	59	Tool Making	11
Mechanical Engineering	27	Tool Room Work	1
Mechanical Dentistry	16	Theology	3
Machine Shop Practice	79	Textile Designing	6
Machine Operation	16	Telegraphy	31
Machine Construction	2	Tailoring	4
Machine Drafting	8	Veterinary	4
Music	14	Watch Making	12
Newspaper Reporting	3	Weaving	1
Navigation	4	X-Ray Course	2
Oxy-acetylene Welding	7		

The men who have suffered bodily wounds, resulting in amputations, ankylosis, and even blindness are by no means the most difficult of the training problems of the Board. It is in fact comparatively clear sailing when dealing with these cases. The disability is generally static when the case leaves the hospital, and there is sufficient accumulated experience by which to be guided. Other forms of disability, particularly the medical cases, present puzzling and often baffling features. The gassed men are an example. Little is known by the rank and file of the medical profession about the respiratory and cardiac effects of war gas-poisoning. The cases generally do not present physical signs commensurate with industrial incapacity manifested by many of these cases as soon as they begin to work.

The traumatic and other war neuroses and the dementia praecox cases are giving the Board serious concern. Many of them are border-line cases and it is a question whether training is at all feasible. If they can be educated, where shall they be sent and how trained? If there is a chance of improvement, they should not have upon them the stigma of the institutions for the insane. The ordinary school does not want to receive psychiatric cases.

The training and placement of epileptics, traumatic or idiopathic, present similar difficulties.

The cardiac cases constitute a considerable percentage of those applying for training. If they are to maintain cardiac compensation, they require careful medical supervision, not only during study and work hours but during leisure hours as well. This is the requirement also for the largest single problem of training and placement, the tuberculosis cases.

In November, tuberculosis and other chest complaints were the cause of disability in more than 4070 of the cases reported by the Bureau of War Risk Insurance. The stream of returning wounded and the retention in army sanatoria of the tuberculous, has steadily reduced this to 18.6 per cent. The District Officer at Denver finds, however, that about 50 per cent. of the cases in his files are tuberculous, while at Atlanta the percentage is about 40, with other chest diseases, such as heart disease, bronchitis, asthma, gassed, etc., making up 33 per cent. more.

I am unable to state how many cases of tuberculosis have been placed in training. Even with 121 employees in the statistical department of the Central Office, it has not been possible to tabulate the number in training according to their disabilities.

To cope with the tuberculosis problems of the Federal Board, the Director sought the coöperation of the National Tuberculosis Association, which resulted in the appointment of an Advisory Committee, consisting of:

Mr. Fred M. Stein, *Chairman.*

Mr. W. H. Baldwin.	Dr. A. J. Lanza.
Dr. H. M. Biggs.	Dr. D. R. Lyman.
Dr. Vincent Y. Bowditch.	Mr. Douglas McMurtrie.
Col. George E. Bushnell.	Dr. James A. Miller.
Dr. Charles J. Hatfield.	Dr. George M. Price.

The Medical Field Secretary of the National Association was detailed as secretary to the committee with an office in Washington.

One of the needs that was at once apparent was general information on the subject of tuberculosis for the 220 vocational advisers whose duty it is to confer with the men and counsel with them as to suitable training courses. These advisers are all laymen, holding the current fallacies regarding climate, light out-door work, contagiousness, etc. They very much needed guides to their judgment in offering training and placement. They wanted lists of occupations that were suitable or unsuitable. It was the unanimous decision of the members of the committee that no satisfactory list could be devised from our present experience; that every case must be considered individually and that every individual job must be judged according to the conditions surrounding that job.

It was determined to prepare a set of standards which would serve as a simple but effective guide in determining occupations for the tuberculous. The factors involved are as follows:

OCCUPATIONAL HEALTH FACTORS FOR THE TUBERCULOUS

GROUP I—Factors due to the personality of the worker

(*a*) Present health.
(*b*) Temperament and education.
(*c*) Choice of vocation and trade.
(*d*) Age.
(*e*) Sex.

GROUP II—Factors due to conditions of work

(*a*) Character of work.
(*b*) Attitude and position.
(*c*) Time, duration and pauses.
(*d*) Fatigue, tension and responsibility.
(*e*) Wages.

GROUP III—Factors due to materials and processes

(*a*) Dusts.
(*b*) Poisons.
(*c*) Gases and fumes.
(*d*) Infectious material.
(*e*) Dangerous machinery and appliances.

GROUP IV—Factors due to the place of work

(*a*) Outdoor and indoor.
(*b*) Construction of work places.
(*c*) Air and ventilation; temperature and humidity.
(*d*) Light and illumination.
(*e*) Sanitary and comforts.

A circular was written, giving, as concisely as possible, general information about the disease with expository material directing the application of the occupational standards. It was first published in the Vocational Summary. So many letters came in expressing the opinion that the circular would be useful among the soldiers themselves and others who might have to deal with them that 100,000 copies were printed in pamphlet form.

As soon as the services of a tuberculosis expert can be secured, he will be sent from district to district to hold conferences with vocational advisers and medical examiners relative to the many problems that arise from day to day.

Some cases of tuberculosis have been discharged from sanatoria and have gone to work. The Bureau of War Risk Insurance has declared them not compensable. Such action, in my opinion, will work injustice to hundreds of men who have served in the belligerent forces. The individual who has had manifest tuberculous disease must live a well-regulated, carefully guarded life. Only after a period of years without recurrence of symptoms referable to tuberculosis can he feel reasonably certain that the disease is permanently arrested. Even under the best possible regimen a large percentage of cases suffer recurrence. He must therefore be looked upon as a substandard life. He has suffered permanent physical damage which is none the less certain because in a negligible percentage the damage is not apparent or because the man is able to earn as much as before he broke down. He has been robbed of a measure of physical freedom and economic possibilities, penalized, so to speak, by disease, and if that disease was activated by military service, he should receive a measure of compensation.

Moreover, it will be still more difficult to retain men under sanatorium treatment if they are to be declared non-compensable when the disease is arrested. To hamper in any way the fulfillment of the enlightened

policy of the Surgeon General's Office would be most unfortunate. It is very much to be feared that men will be strongly tempted to demand early discharge if they can thereby secure a compensation which is not available when the disease is arrested.

For the purposes of the Bureau of War Risk Insurance in carrying out the spirit of the Compensation Act and of the Federal Board for Vocational Education in providing training and placement in needful cases, it is the opinion of the Advisory Committee that every case of tuberculosis should be considered as having sustained more or less permanent disability; and that there should be a minimum percentage fixed for the guidance of Army, Navy and War Risk medical examiners. This committee is in accord with the Board of Directors of the National Tuberculosis Association which passed the following resolution at its meeting of March 5, 1919:

Resolved, That a man with proven tuberculosis is entitled to compensation, the minimum rate of which should not be less than 25 per cent.

Copies of this resolution have been forwarded to the Surgeon General of the Army, and the Directors, respectively, of the Bureau of War Risk Insurance and the Federal Board for Vocational Education. Should such a ruling be deemed too sweeping and likely to put an unjust burden upon the Federal Government, it has been suggested that every award to cases of tuberculosis may be subject to possible downward revision after the lapse of a period of years—never less than three. The beneficiary, however, should always have opportunity to apply for increased compensation where it appears that the disability has increased since the Bureau's award. Compensation should not be withdrawn because of individual success in overcoming the handicap, as measured by the individual's earning capacity. It is the sense of the Advisory Committee that tuberculosis should be included among the so-called specific injuries of Article III, Section 302 (2) paragraph two of the War Risk Insurance Act.

Since the functions of the Federal Board for Vocational Education are dependent upon the awards of the Bureau of War Risk Insurance, it is essential to the successful conduct of its work that there should be settled policies relating to compensability of disabled men. The present lack of such settled policies is a source of discontent among many of the men and of injustice to some of them. It is hampering the administration of the Rehabilitation Act.

It was recommended, therefore, that the Federal Board exert every effort to secure a clear-cut definition of policy and program by the Bureau of War Risk Insurance so that its own policies and program may be stabilized.

One of the earliest problems confronting the Federal Board was the question of curative diversion and work (occupational therapy and prevocational training) for discharged tuberculous soldiers and sailors under the care of the Bureau of War Risk Insurance in private sanatoria.

Rest has become firmly established as of first importance in the treatment of tuberculosis. When rest should begin for active tuberculous disease is never questioned. It is immediately the case is discovered.

What constitutes rest, how long it shall continue, how it shall be modified are questions that develop endless discussion. Rest and idleness have sometimes been confounded. There has been a tendency to emphasize physical rest—bodily inactivity—without due consideration of the mental state of the patient. In certain cases, nearly absolute cessation of muscular movement is necessary but continued inactivity may defeat its own end. Rest includes freedom from anything that wearies, disturbs or troubles. It involves peace of mind as well as bodily inactivity.

The successful treatment of tuberculosis is prolonged and tedious. "One thinks of many things in bed," said a tuberculous woman. What those thoughts are may decide the patient's fate. Whether they are pleasant or unpleasant, hopeful or gloomy, or rather, which shall predominate depends upon the individual temperament and education and upon environment. If the external stimuli to which the patient must react are not well ordered; if there is nothing to keep him from the tendency to introspection, from magnifying his troubles, pondering upon his disease, speculating upon symptoms and prognosis, much of the value of physical rest will be lost.

Occupation of the mind is often the best form of rest, and occupation of the hands is the means by which the mind may best be occupied. It is the use of the skeletal muscles which tends to break down the tuberculous man, but these muscles are of less value in securing mental occupation. Their use has little cultural value unless the work performed is unusually varied and constructive in character. It is the smaller muscles that have distinct cultural value, stimulating interest, imagination and ambition. The hands trained to elicit harmony from the strings of harp or violin, that deftly weave a basket or shape the clay into artistic forms, that with square and compass make a constructive drawing, received their impulses from an interested and developing mind.

It has been found repeatedly in this country and in Canada that the discipline and morale in tuberculosis sanatoria improve immediately when occupational therapy is introduced. It is also easier to keep the patients under treatment until the arrest of the disease is attained.

Occupational therapy is generally divided into three parts or stages, as applied in treatment:

(*a*) Diversional therapy.
(*b*) Occupational therapy.
(*c*) Pre-vocational training.

Therapeutic results must be kept in view as the main object but if the work given can be such that it will lead up gradually and naturally toward vocational training, so much the more is gained. Curative work must be progressive and constructive. "Short of actual drudgery the more useful the work the better its therapeutic results, and conversely, the more trivial and valueless the product of the work, the less effective will it be in the therapeutic sense." (Herbert J. Hall, M.D., Marblehead, Mass.) It must stop short of physical and mental exhaustion. Recently a reconstruction aide, illustrating how much the men enjoy the workshop, said that one man with heart disease became so absorbed with

the thing in hand that his face and lips became deeply flushed and almost purple. That man was undoubtedly getting a therapeutic overdose.

In considering the problem of War Risk cases it was found that they were scattered in very small groups in private sanatoria throughout the country. It was manifestly impossible from the financial and administrative standpoints for the Federal Board to introduce occupational therapy unless the cases could be concentrated.

It was recommended, therefore, by the Advisory Committee on January 17, 1919, that the Federal Board make every effort to induce the Bureau of War Risk Insurance to concentrate in selected sanatoria, so far as possible, the compensable tuberculous cases, and that the Federal Board should provide occupational therapy and pre-vocational training wherever twenty or more such cases were gathered in one institution.

The Federal Board accepted this policy, but thus far the work has not been widely extended because of the difficulty in finding satisfactory instructors. Occupational therapy and pre-vocational training, however, have been introduced for the Bureau's patients at the State Sanatorium of North Carolina, at the Hendricks and Wiley Sanatoria in El Paso and at the Rutland Private Sanatorium Association. The results thus far have been very gratifying. I am convinced that the results of supervised objective exercise, i.e., exercise with a purpose beyond aimless walking as shown among soldiers and sailors in Canada and the United States will stimulate the adoption of this form of therapy in our civilian institutions. As I have said before, it is imperative that tuberculous, cardiac and gas cases shall receive their vocational training under careful and continuous medical supervision after discharge from treatment. Already some of these training cases are broken down.

Negotiations are now in progress to make Rutland, Mass. a training center for the tuberculous. The Federal Board has appropriated $10,000 for necessary equipment and instructors. More shop room and housing are needed.

A productive vocational workshop conducted on the general plan of the garment shop of the Committee for the Relief of the Jewish Tuberculous, is to be established in New York by the New York Committee on Tuberculosis. The National Association has agreed to subsidize this shop up to $10,000.

The Catholic War Council is considering the establishment of a training center in Pennsylvania which they hope may develop into an agricultural and industrial colony.

Mr. T. B. Kidner, Special Adviser to the Federal Board on Rehabilitation, has just returned from Tucson, Arizona, where he has arranged a tentative agreement with the University of Arizona for the vocational training of handicapped soldiers and sailors, including arrested cases of tuberculosis in the Southwest.

No active cases are given any form of training outside of a sanatorium, but are rather urged to accept treatment at the expense of the Bureau of War Risk Insurance.

The Federal Board is confronted with the same problems of place-

ment of arrested cases in industry that have harassed anti-tuberculosis workers for so many years.

The "light out-door job" which the man thinks he must have is seldom to be found. Part-time work is still more difficult to obtain. There yet remains an appreciable degree of prejudice among employers and fellow-workmen against the employment of known tuberculous people.

Normal industry, however, will absorb some of these cases. Our sanatoria will provide employment for a small percentage. Productive shops, if more of them are established (and it is hoped that several cities will follow the lead of New York) will care for still others. But there will still remain a group unprovided for. In the ordinary walks of life without supervision they would break down.

Any study of post-sanatorium problems inevitably leads to a consideration of colonization schemes as a possible solution for some of the problems.

The Advisory Committee has given thoughtful consideration to this feature of treatment. I have had the opportunity to gather the literature on colonies for the handicapped which has grown quite extensively since the war began, and to offer a definite colony plan for a combined industrial and agricultural community.

The limits of this paper will not permit a full description of the proposed community, which will appear in THE AMERICAN REVIEW OF TUBERCULOSIS and as a Federal Board Bulletin. Both issues will contain abstracts from the literature and a summary of discussions with a number of tuberculosis specialists and tuberculous patients.

Briefly it is suggested that there shall be purchased 1000 acres of good productive land, partially wooded, on high, rolling ground not too far distant from large centers of population. It shall be situated on a main line of railroad within reach of raw materials and ready markets. From 75 to 100 acres should be apportioned for community development, the remainder to be cut up into small farm tracts ranging in extent from 2 or 3 to 30 or 40 acres, all under the direction and management of a practical farmer, who could give instruction in general crop production and specialized farming such as poultry and bee keeping, dairying, truck gardening, fruit culture, etc.

The project would be controlled by five trustees consisting, say of two business men, a medical expert in tuberculosis, a lawyer and an educator. There would be an administrative staff comparable to the commissioners in a commission-manager form of city government. They would comprise the managing director, director of industry and public works, director of public health, director of education and publicity, and an auditor.

The village proper should be laid out according to modern ideas of town planning. Its general features, in my opinion, should conform to those of other American towns, rather than to English garden villages. It would differ decidedly, however, in that growth would be a matter of plan and forethought and in that its water supply, sewerage system, schools, etc., would be modern and complete from the standpoint of sanitary engineering.

Every person, man, woman or child who took up residence would be given a complete physical examination, including stereoscopic chest plates and biologic tests. Periodic reëxaminations and special examinations when indicated would preserve a life history of the "human machine," making it possible to reduce greatly the morbidity and mortality rates.

Open-air schools and carefully planned homes would offer opportunity for a demonstration in rural community housing.

Our investigations lead us to believe that there would be no difficulty in securing for the community suitable industries; nor difficulty in inducing large numbers of selected cases to come to such a community.

An expenditure of about $2,000,000 over a period of two years will provide for all the community needs for a population of about 1000.

The whole study is published by direction of the Advisory Committee for the purpose of arousing discussion among those who are interested in any way in the tuberculosis campaign.

This in general is the program of the Federal Board for Vocational Education. It has been my privilege to observe the work of the Board during the past six months and to know of the difficulties that have been encountered in the building up of a large organization in a brief period. The majority of the staff are imbued with the spirit of conscientious service to our handicapped soldiers and sailors. Strenuous effort is being made to perfect the internal organization and to push the work of restoration to successful completion.

SOCIOLOGICAL SECTION

THIRD SESSION

REMOVAL AND RELIEF OF POVERTY AS FACTORS IN THE PREVENTION OF TUBERCULOSIS

The Chairman: I do not know of any other topic or question that is more baffling than the question of relief, especially for tuberculous patients. There are some who say that nearly three-fourths of our people are undernourished, and that they should have some form of relief in order to be kept up to par and from developing tuberculosis. Dr. Krause, I believe, is authority for saying that most of us have tuberculosis, and it is only by keeping up our vitality and our resistance that all of us do not come down with this disease. The question of relief then is very important. Who is to give this relief? How much is to be given? Shall it be given by a private society, by a public agency of some kind, such as the overseer of the poor of the municipality, or a public welfare board, or what agency shall give the relief, or shall we provide some form of insurance against this sickness? I do not believe there is any question in the minds of the tuberculosis workers but that this relief should be provided in some form or other. We must all stand for an increase in wages, perhaps, or a more adequate wage for our working people so that they may live, and receive the proper amount of nourishment, and thus prevent them and their families from getting below par and developing this disease. How much relief should be given is a very important problem. How is it to be distributed? Shall it be doled out by the overseer of the poor? Shall it be doled out by a charity organization society, or shall we limit the relief of the tuberculous patient simply to the bare necessities? How far shall we go? This topic will be discussed first as to the relief in the home, by state, by municipalities, by private agencies, by Walter S. Ufford, Secretary of the Association for the Prevention of Tuberculosis, Washington, D. C.

RELIEF IN THE HOME, BY STATE, BY MUNICIPALITIES, BY PRIVATE AGENCIES

By WALTER S. UFFORD

WASHINGTON

"I BELIEVE that I am a consumptive and will die, unless I can take the treatment, which requires rest, outdoors, and much good food.

You believe that I am infectious; a danger to you and yours, and the community.

We believe, you and I, that if I go on working, I will die; and while I am dying at my work, I will form also a starting point for the same dread disease amongst my comrades, and my own family.

I believe that my disease is not my fault; I got it from a poor fellow, who was situated then just as I am now; he kept on working beside me until he died. That's how I got it.

You believe it is not your fault; of course not—you did not give it to me.

We believe, you and I, that it was the fault of the community, who left that previous consumptive to work beside me, while he was dying.

I know I am not a pauper, or a charity case, now, but soon I will be both; and then I will be so far gone in my disease that I will die anyway. That is a nice prospect!

You know that if I quit work and "loaf" at home, I'll be more dangerous to my folks, than I would be to my comrades, because I will be with them twice as long every day.

We know, you and I, that consumption can be cured if taken in time; that it becomes worse, and more infectious as it goes on; that every month, every week, every day that I go on without rest, outdoors, good food, makes me worse, more dangerous and poorer; I tell you it costs money to be sick.

My people cannot stand the expense if I "loaf" at home; they cannot stand the expense of my taking treatment that would cure me. They cannot afford to let me die.

I must work to live; and if I work, I die!

For God's sake, Gentlemen, what am I to do?"

The foregoing taken from the *Minnesota Public Health Association Journal* may well form the text for our consideration of the topic before us for this symposium: "Removal and relief of poverty as factors in the prevention of tuberculosis," a subject which we are to discuss under two divisions, the one assigned to me being: Relief in the home: by state, by municipalities, by private agencies.

First. A word on the general subject, "Removal and relief of poverty as factors in the prevention of tuberculosis."

We know of no statistics which show with any exactness the part which poverty plays either as the cause or the effect of tuberculosis. Yet I take it that we are persuaded from our own experiences that the relation of poverty to tuberculosis is a very real one.

A recent writer in an effort to evaluate the different means employed to combat tuberculosis assigns, on the basis of 100 points, 39 of these points to the "elimination of pre-disposing causes" and under this general

topic he allows a credit of seven points to "ameliorating poverty." If for his term "ameliorating poverty" we were to substitute the more radical one of "abolishing poverty" would we not all agree that the percentage of value instead of being seven would be several times seven?

Certainly those of us who are familiar with the part that sickness plays as a factor in dependency might hesitate to accept so small a percentage of credit as seven assigned to the amelioration of poverty as a factor in the prevention or control of tuberculosis.

The director of one of the largest social relief agencies of the country stated a few days ago at the National Conference of Social Work held in this city that approximately one-half the expenditures for relief made by his society went to families affected by tuberculosis and in about one-half of the families of widows receiving allowances or pensions the men had died of the disease.

The oldest charity organization society in America, which annually tabulates in its report the amount expended in material relief, spent last year 76 per cent. of its total relief disbursements in families where there was sickness and of this amount 30 per cent. went to families handicapped by the presence of tuberculosis.

Now these figures may show nothing more than that poverty is the effect of tuberculosis not its cause. I understand that in the draft board examinations the incidence of tuberculosis was fairly well distributed among the candidates from all ranks of society.

In 1914 there were approximately 143,000 deaths from pulmonary tuberculosis in the United States. Seventy-five thousand of these deaths occurred in the industrial workers groups. These groups contribute about one-third of the population. The deaths from tuberculosis, however, instead of constituting one-third of the entire number constituted more than one-half, or an excess of nearly 19 per cent. or approximately 27,000 deaths. Here again was it living and economic conditions which produced the over-plusage or industrial conditions?

While, therefore, we may not be able to demonstrate statistically the relation of poverty to tuberculosis probably there are few of us but believe that if poverty could be abolished from the general scheme of things we should see a great decline in the death rate from the disease.

Dr. Allen K. Krause, managing editor of THE AMERICAN REVIEW OF TUBERCULOSIS, in an address delivered last November before the New Jersey joint conference on tuberculosis said:

> Most men to-day agree that strain is an all important factor in bringing tuberculosis into the realm of consciousness; and, if this be granted, it must be equally true that its opposite, that is, relief, or comparative relief, from strain, will operate toward keeping quiescent tubercle in abeyance. It must therefore be perfectly certain that anything that leads to an amelioration of the general habits and conditions of life of masses or classes of people will work toward a subsidence of tuberculosis. . . .
>
> The tuberculosis mortality rate began to decline in practically every country that was advancing industrially and was therefore increasing in wealth, as early as 1850 and for perhaps ten or twenty years before. This, remember, was thirty years before the discovery of the bacillus. In other words, tuberculosis began to abate its terrors before

man intentionally applied a single measure to combat it. Personally I can see only one reason for it, and this is the gradual bettering of the conditions of labor and living of the mass of the people that was ushered in, markedly, shortly before the middle of the last century and took on a tremendously accelerated impetus after 1880.

Ask any sanatorium superintendent what the chances of recovery for his patients may be after leaving the institution and will he not tell you that everything depends upon the kind of life the patients lead? And will not this be determined largely by the ability of the patient to husband his reserves, to be free from worry, overwork, to command proper living conditions in the home, and to select favorable working conditions?

Pardon what may seem an unnecessarily long discussion of the main topic. But for the first speaker of the morning, this general, if somewhat cursory review of the relation of poverty to tuberculosis may not be out of place by way of introduction.

If the removal and relief of poverty be important factors in the prevention of tuberculosis how may such relief be afforded, particularly in the home?

Our subject names three agencies for this purpose. The state, the municipality and private agencies. Considering the last first, what can the private agency do? By "private agencies" I assume we mean family work agencies like the charity organization society rather than anti-tuberculosis societies. The latter seem fairly well agreed that their sphere is educational rather than relief-giving. In the absence of other provision, certainly in its own sphere, it is up to the family work agency to see that the home is kept intact while the man goes to the sanatorium or hospital. The Red Cross Home Service Sections have accepted this responsibility for families of tuberculous soldiers and sailors where for any reason compensation is delayed or is insufficient under the War Risk Act to take care of the family.

Private agencies dealing with the civilian should of course see that the giving of relief in the home does not dissuade the man from going to the sanatorium particularly if there are children in the family and his case is an open one.

You are doubtless familiar with the Home Hospital demonstration of the New York Association for Improving the Condition of the Poor, but even here I understand that open sputum cases are not encouraged to stay with their families.

The difficulty in the practice of general relief by private agencies is that in so many localities the relief is limited in amount by limited resources and is almost inevitably associated with the word "charity" in the sense of "alms." The consequence too often is that the acceptance of relief as charity comes too late, and when given is inadequate to see the family through while the man is away, or to ease the man's burdens when he returns to his home with the disease arrested. Such charitable relief, in my judgment, by virtue of its association with almsgiving, occupies too limited a field to enable it to cope with the situation as a whole.

If, then, private agencies or family work societies can play but a

limited part in home relief what of the municipality and the state? On this point,I have sought information from several of the larger cities, that I might learn their policy in this regard.

The acting commissioner of health of Cleveland describes the policy of that city as follows:

> Whether the patient is in the home or sanatorium, relief, in the way of food is given by the *outdoor relief*, and rent, heat and clothing by the Associated Charities.

Here we see a divided responsibility. The private agency pays the rent, furnishes fuel and clothing, while food is provided from the city treasury.

Mr. James Minnick, Superintendent of the Chicago Tuberculosis Institute, informs me that the municipal sanatorium law of that city provides that the sanatorium board can extend relief in the homes of the patients but thus far has not done so except in cases of building porches or supplying bedding for the use of such patients. All relief to the families of tuberculous patients must be provided by the United Charities or by the County Agents. But even these grants are not given to the amount that would be allowed by the mother's pension system. The *State* of Illinois makes no provision for tuberculosis whatever in any form. There is, however, a law which enables the counties to build and maintain sanatoria and to give relief in the home, but as yet no counties have availed themselves of the clause enabling them to give relief in the home.

Mr. R. Barclay Spicer, Executive Secretary of the Pennsylvania Society for the Prevention of Tuberculosis, writes me that in Philadelphia all matters of relief in connection with tuberculosis are taken care of by the Philadelphia Society for Organizing Charity and by other private relief agencies. In other parts of the state Red Cross seal money has been spent in relief, but increasingly now relief is being taken care of by the local charity organization society when such exists or by special appeals. Formerly the State Department of Health through its dispensaries furnished milk and eggs, but it has not furnished any relief in connection with families of patients sent to state sanatoria. Now the State Department of Health has discontinued the furnishing of milk and eggs and does nothing whatever in regard to other relief. Quite generally through the state the State Department of Health nurses by appealing to the poor directors of the county secure aid for families of patients sent to sanatoria.

In Brooklyn, according to Mr. Graves Moore, Secretary of the Committee on the Prevention of Tuberculosis of the Brooklyn Bureau of Charities, the municipality makes no provision for supplementing the family income because a member of the family has tuberculosis. The relief agencies of the city assume this responsibility.

Mr. Otto F. Bradley, Executive Secretary of the Anti-Tuberculosis Committee of the Associated Charities of Minneapolis, informs me:

> If the sanatorium patient is the father of a family the mother's pension is available to the extent of $15 per month for one child and $10 per month for each additional child.

This is considered an inadequate sum and there is a movement on now to have the maximum increased on account of the high cost of living.

In cases where the patient is the mother, the Associated Charities or other private relief organizations give aid in the homes if conditions warrant. They also supplement in certain cases a mother's pension. The City Poor Department sometimes grants aid in the homes.

Mr. S. H. Stone, Secretary of the Boston Association for the Relief and Control of Tuberculosis thus outlines the general policy of the state of Massachusetts:

In general the family of a patient sent to a state sanatorium is treated as any other family needing relief. It is provided for either by a private charitable organization or the overseers of the poor.

There are, however, two important principles in the Massachusetts method of procedure as to relief to which I should like to call special attention. Mr. Stone states them as follows:

In this state, tuberculosis is considered a disease dangerous to the public health and if a patient or member of his family is quarantined because of the disease, the quarantined person shall receive from the city or town during the period of his restraint compensation to the extent of three-fourths of his regular wage.

And again, Massachusetts has a law which in substance is as follows:

No person for whose care and maintenance a city or a town of the commonwealth has incurred expense in consequence of tuberculosis or other disease dangerous to the public health shall be deemed a pauper by reason of such expenditure.

In these two provisions it seems to me we find valuable suggestions for a sound public policy in the way of lifting economic pressure from the family or patient in cases of tuberculosis.

Assuming as we may, that poverty, real or threatened, and either as cause or as effect, plays a large part in the spread of tuberculosis (1st) by furnishing a motive to the victim to keep at work to support his family long after he should have stopped and taken treatment; (2nd) by limiting the possibility of applying the only means of arresting the disease known to science, namely medical attention, rest, proper living conditions, with plenty of fresh air and good food; (3rd) by reducing the patient's family to a condition of living below its normal and thus endangering the family's resistance to exposure; and furthermore, agreeing as we do that the real hope of conquest lies in adequate treatment of every case of the disease with something akin to compulsory or voluntary segregation, let me suggest for your consideration, in the interest of the public health—and that is the strength of the argument rather than the plea for any particular patient or his family—in the interest of public health, the wider application of the Massachusetts principle. Let me quote Mr. Stone again:

In this state tuberculosis is considered a disease dangerous to the public health, and if a patient or a member of his family is quarantined because of the disease, the quarantined person shall receive from the city or the town during the period of his restraint compensation to the extent of three-fourths of his regular wages.

Instead however of making the compensation three-fourths of the man's wages let it be full wages if you will.

If Professor Fisher's estimate of the annual loss from tuberculosis in this country be accepted, a loss of approximately one and one-fourth billions of dollars a year, the cost of the policy suggested will not be comparable to the loss from neglect following an in and out, happy-go-lucky policy such as now so generally obtains.

Tuberculosis is dangerous to the public health. It produces poverty. Poverty produces tuberculosis. Poverty or the fear of poverty is one of the greatest obstacles to voluntary acceptance of treatment. Delay is too often fatal.

With the coming of universal medical examination tuberculosis will be discovered much earlier. Place a bounty if you will upon its treatment. Let no man or woman because of poverty or the fear of poverty be tempted to lose a day in placing himself under medical care and instruction. Extend our mothers' allowance laws now adopted in 36 or more states in one form or another to take in the tuberculous family. Let not this be considered charity or the recipient a pauper. Again I quote the policy of Massachusetts:

> No person for whose care or maintenance the city or town of the commonwealth has incurred expense because of tuberculosis or other disease dangerous to the public health shall be deemed a pauper by reason of such expenditure.

No man is going to cultivate tuberculosis in order to take advantage of public relief. No family is going to seek the disease for the sake of a bounty. There may be danger of malingering following sanatorium treatment under the influence of hospitalization. But the bounty will stop when the man is no longer dangerous to the community or to his wife and children.

We complain that we do not discover tuberculosis in its early stages. Let us pay a premium if necessary for such discovery. One of the greatest deterrents against seeking early diagnosis, perhaps, is the financial consequence of finding that one has the disease.

The public should for its own protection be prepared to underwrite the expense of treatment. If the public once pays to protect itself, instead of compelling the family to protect the public—a policy resulting in dependency and loss of standards and in repeating the misfortune of the patient to the third and fourth generation—the public will awake to the seriousness of the situation. We shall revise our public school teaching by making health compulsory and health training universal.

Let the economic burden be shifted from the patient and his family to the state; not so much in the interest of the family or the patient but in the interest of the community at large which thereby greatly increases its protection from the further spread of the great white plague.

Already many states furnish free sanatorium and hospital care to their patients who cannot afford to pay. Let us extend the principle so as to take adequate care of the families wherever necessary.

If ameliorating poverty will only reduce tuberculosis 7 per cent. then

the burden of relief will not be serious. But if poverty plays a much larger part in the spread of the disease all the more important is it that this factor be eliminated if possible. That is what the War Risk Act is doing for the tuberculous soldier and sailor and his family. That is what social insurance would do as we shall learn doubtless from the succeeding speaker.

The community has underwritten the soldier and the sailor. Let industry and commerce bear its own burden, and the community do for the civilian what it is now doing for the soldiers and sailors.

May I conclude with the moral drawn by the writer of the text which we selected at the beginning of this paper. What did the poor fellow do who asked "For God's sake, Gentlemen, what am I to do?"

"What did you do? He's *dead* now; his family is infected from him; some of his comrades at work are infected, too; certainly one or more persons, will follow him down that same sunless path of suffering, poverty and death, because he died, neglected.

What will *you* do about others, still living? Nothing, as you did about him? No! This thing must stop; stop it now."

DISCUSSION ON PAPER BY MR. UFFORD

Karl De Schweinitz, Philadelphia: Tuberculosis is the most expensive of diseases. It fastens itself upon its victims at the very time when they should be at the height of their earning powers. Months and years usually pass before it loosens its hold and even though the patient may succeed in conquering it he is likely to find himself handicapped ever afterward in competing in the open market with his fellow workmen.

Not only does tuberculosis cut off that part of a man's income which he derives from wages, but by reason of its dietetic and medical demands it increases the debit side of his budget. Thus many families are unable to finance themselves through an attack of this disease and the problem of supplying or supplementing the income of such households is one of the most perplexing questions which social work must answer.

How can the money for this purpose be obtained and who shall administer it? Private charity is the oldest attempt toward a solution of the problem. For years it has been trying to provide the funds needed by families which have been forced into bankruptcy by tuberculosis.

There have been many advantages in this approach to the problem. The administration of relief by private agencies has been accompanied almost universally by thorough instruction in prophylactic measures, by careful supervision of diet and of home conditions, and by attention to the health of all the members of the patient's household. The well have been helped to adapt themselves to the presence of the sick person and the patient has been aided in adjusting himself to the fact of his handicap. The strongest recommendation, indeed, for relief by private charity is the personal service which it carries with it.

Counterbalancing this advantage, however, is the disadvantage that, no matter how effective agencies supported by contributions may be, their resources are limited. They have never been able to meet the needs

of all the families which have been disorganized by tuberculosis, and the financial relief administered by them has more often than not been inadequate in amount for the family to which it has been applied.

This situation is the product of a number of causes. In the first place, the conception of adequacy of relief is a comparatively recent development in modern social work and has not yet won general acceptance. In the second place, the demands upon private charity in its effort toward adequacy have been greatly increased in the last few years by the development of higher standards of social work. The introduction of the budget system for families, the limitation of home work, the passage of laws prohibiting child labor and restricting night work for women have added to the amount of income that must be supplied from sources outside of the home. The situation has been further complicated by the rapid rise in the cost of living. The effect of all this is shown in the expenditures of charity organization societies everywhere. The Philadelphia Society for Organizing Charity, to cite one example, spent for relief in the year ending September 30, 1913, $18,000. Its expenditures for the year ending September 30, 1918, were $91,000—an increase of 400 per cent.; at the present rate of expenditure the Society's relief budget for the year ending September 30, 1919, will not be far from $140,000. Despite this advance in relief at a time when the number of families under care is not large the family budgets of the society are only approaching adequacy.

Obviously so rapid an increase in expenditure as has been indicated cannot be paralleled continuously by a corresponding growth in contributions. The burden of adequate relief is too great for private charity. Indeed it is a burden that philanthropy has never borne. Charity organization societies, for example, have always in effect placed a limitation upon the financial assistance they have administered. The old psychology of the danger of relief giving has lingered in a strong enough form to prevent most of them from extending relief to the point of bankruptcy, and yet charity organization societies are more nearly adequate in this respect than with one or two exceptions are any other of what the public inaccurately describe as relief agencies. The relief standards of charity organization societies are far in advance of those of the general public itself. To them tuberculosis workers can with confidence turn for assistance for families in which they are interested.

Those households which these family social work agencies receive for social treatment can be assured of the highest available care. But even granting that "the highest available care" means adequate relief the total number of persons thus affected will be small. They will represent only a fraction of the need. The financial problems of tuberculous families are too great for private charity to solve alone.

Is public outdoor relief the way out? In its historical character it has been notoriously inadequate. Within the last ten years, however, its standards have been greatly advanced by the influence of the movement for mothers' pensions. Where this has been felt there has been a nearer approach to adequacy. Generally speaking, however, public outdoor relief has not been as effective as that supplied by private charity. The

fight for sufficient appropriations to mothers' pension funds has not yet been successful.

With possibly one or two rare exceptions the universal experience has been that the state has not met the needs of mothers who have not the means for the support of themselves and their children. Continued educational campaigns emphasizing the importance of allowances to mothers with children will undoubtedly result in increasing the money made available for this purpose by the public. Similar efforts will also insure larger allowances to individual families, for here too public outdoor relief has not approached nearly so close to adequacy as has private charity. In short, the problem of obtaining money enough from the state for dependent widows with children is difficult enough to absorb the attention of the public for a long time. To undertake in addition to this the assistance of families which have been incapacitated by tuberculosis would only mean greater inadequacy in those forms of relief that are now being administered by states and municipalities.

Relief, moreover is essentially not preventive. It comes after the fact. It may and does stop the disease from spreading to other members of the patient's family but it obviously cannot prevent the patient himself from contracting consumption.

For this kind of preventive work we must turn elsewhere. The experience of workmen's compensation rather than that of mothers' pensions offers the most appropriate suggestion for anti-tuberculosis workers.

The fundamental idea of workmen's compensation is protection. It is a form of insurance, the logical development of which is prevention. The essential conception of relief is remedial, its highest development is reconstruction.

While private charity can be depended upon to do a high type of work for a large, although limited number of families, and while undoubtedly public relief will increasingly become a resource for the care of families suffering from tuberculosis, the measure that can most logically be included in the anti-tuberculosis campaign is health insurance.

This is not proposed as a substitute for relief. It may, however, be advocated as tending to reduce the need for relief.

The fact of insurance gives a man a certainty of support in sickness. It, therefore, induces him to take early treatment for his disease instead of working to the point where all chance of recovery disappears. It is just this certainty which relief inevitably and necessarily lacks. Moreover, just as workmen's compensation has stimulated the spread of the safety first movement can we not hope for a health first movement as a result of insurance against sickness? Would it not be the means of instituting periodic physical examinations and of emphasizing the practice of personal hygiene? Assuredly also it would involve adequate medical care, for this is an integral part of every system of health insurance.

It would enable many families to solve in their incipient form problems which now are allowed to reach those complicated stages when public or private relief must be summoned to the rescue. Thus while tuberculosis workers should support the efforts which public and private agencies are

making toward adequacy in relief their great opportunity for constructive and hopeful effort lies in the adoption and prosecution of active measures for the establishment of health insurance. This is the logical next step in the persistent and long continued war against the white plague.

Miss Erle Chambers, Little Rock: I should like to ask the gentleman if he knows of any charitable organization in any of the big cities that has tried out a plan of farm colonization on the family basis, under scientific management and if so what has been the effect of the experiment.

Mr. De Schweinitz: The Philadelphia Society for Organizing Charity has never tried a plan for farm colonization and I have personally never been connected with any such experiment. Charity organization workers have again and again attempted to induce individual families to leave the city and start life in the country. For the most part these experiments have been unsuccessful. A city family to be successful in the country would be obliged to have a knowledge of agriculture. It would, also, have to have a desire for farm life. Most families which have been living in the city and have become accustomed to city life would not be happy in the country. They want a city environment.

Miss Chambers: That perhaps applies to farm life, but what I have in mind is the small farm under the scientific management plan, such oversight as our southern county farm demonstrators could give.

Mr. De Schweinitz: I can only speak from my own experience. We have not tried colonization in any broad or wholesale way. It has only been attempted with individual families and has usually resulted in failure. I know of a few instances in which transplanting from city to country has been successful, although as a matter of fact the most interesting of these did not involve farming. I wonder if tuberculosis workers would classify farming as light outdoor work?

The Chairman: Not every tuberculosis society is fortunate in having a charity organization society which is willing to admit that it gives adequate relief, as in Philadelphia and Washington. In fact, I know of few places where a charity organization feels it is responsible to the tuberculosis agency to supply the relief. I think it would be most interesting if we could hear from a few of our tuberculosis agencies over the country to know how the relief question is being solved.

Aretas E. Kepford, Des Moines: In Iowa we have a law that makes it mandatory on Boards of Supervisors to take care of what I shall term here "indigent" persons suffering from tuberculosis. This law authorizes the Board of Supervisors to spend a sum not to exceed $15 a week for the care of such persons. Now this, of course, does not mean the care of the family. It simply takes care of the individual. This law was passed about six years ago and has been very beneficial. Of course, in Iowa, we do not have the profound or acute problem that you have in the big eastern zones, but this is one of our methods of relief.

Representative of Kensington Dispensary, Philadelphia: Mr. De Schweinitz emphasized the fact that the relief comes in after the disease is started, and of course it is because of the financial problem that the patient does not get the treatment in time. I feel like saying from ex-

perience that I think the evening clinics and the dispensaries could help a great deal. The people are able to come to the dispensaries in the evenings and receive treatment without losing their employment. We believe that if there were more evening clinics, the doctors coming after the office hours, and the patients coming after their day's work, it would help, and I am frank to say we can point to a great deal of progress in that way. The patients are able to maintain themselves while they are getting the treatment and that does away with the need for relief afterwards. Then, too, the whole family receives instruction as to prevention.

Dr. H. A. Farris, St. John, N. B.: Just now there is a great agitation for institutionalizing all patients. It seems to me that this is a mistake. My experience has been that this takes the responsibility off the community, for as soon as a patient is in an institution the community is relieved of the responsibility for the family. A patient cannot be treated in an institution for less than two dollars a day at the present prices. You might spend that two dollars a day in his own home, changing the home conditions, and one patient cured at home is worth three or four patients cured in an institution. It is necessary, of course, to have institutions for the early cases and hospitals for the advanced cases, but in the city of St. John we are spending to-day $60,000 in a municipality of 70,000 people, on institutional work; we are spending about $1500 on dispensary work, and not one cent on home work. Now there is an agitation for increasing our hospital facilities. If, instead of increasing the hospital facilities and spending $30,000 more, we can spend the $30,000 in treating these patients in their homes, then the public will feel the responsibility and will educate public sentiment to demanding better home conditions.

I think it is more a matter of preventing the development of the disease than of preventing the infection. In 30 or 40 years we may have to take up more the question of infection. At the present stage I believe we are infected and there is very little danger from outside infection. I think that where there are children we must prevent their being infected, but at present, with the amount of money we have, I think the thing to do is to get the home conditions of the patient right, and then, if the patient cannot be handled in the home and there is danger of infection, let him go to an institution. But because a man has tuberculosis it does not follow that he cannot be treated in his own home. He can remain at home in perfect safety if there is adequate supervision by properly trained nurses.

Mr. Ufford: I wonder if we could have the paper on social insurance and then further discussion.

SOCIAL INSURANCE AS A MEANS OF RELIEVING POVERTY

By JOHN A. LAPP
Chicago

The subject of the discussion this morning is the relationship of social insurance to the relief of poverty. If I were to interpret that subject literally and stick to it, I would not be able to make an address for the simple reason that social insurance is not intended to relieve poverty and as an insurance proposition could not do so. When, however, we interpret the word "relief" to mean the prevention of poverty the complexion of the subject changes. Social insurance against sickness will prevent poverty, but it is the province of other agencies to relieve poverty after it has been created. Social insurance against sickness, which we prefer to call health insurance, is intended to stabilize society above the poverty line and to prevent people from slipping down into economic distress or destitution. It is intended to prevent the able-bodied man who, in normal times, earns his own living from being driven into poverty when his health fails and his earning capacity is gone.

The relationship of health insurance to poverty ought to be made absolutely clear. Much deception is being spread about by special interests opposed to health insurance and by their propagandists to the effect that health insurance will not take care of the man in poverty and therefore fails. Health insurance is insurance against the loss of working power by those who have working power. If a man is in poverty and has no working power he has nothing to insure. The accumulated poverty caused by centuries of neglect cannot now be thrown upon an agency which has no more to do with poverty than it has with the cost of living, the tariff or the trusts. Again, let me repeat that health insurance is intended to insure working men against the loss of their working power. If it does insure people against the losses which occur from sickness, including the loss of earnings and the cost of medical care, it is perfectly obvious that it will prevent people from being driven by sickness into the depths of destitution.

Health insurance is a plain business proposition. There is nothing mysterious about it and its application on a state-wide social scale is only the application of well-established business principles and follows the numerous precedents already to be found in this country. The insurance principle is a simple one. Whenever a number of people are subjected to a common risk, the insurance principle may be applied if the risk is measurable. Insurance is merely a distributor of loss. Fire insurance measures loss from fires and fixes the premiums to cover pos-

sible losses. Marine insurance does the same for shipping disasters. Life insurance measures the number of deaths and fixes the premiums necessary to pay a certain sum at death. There are numerous other forms of insurance such as insurance against hail, tornadoes, accidents, burglary and plate glass breakage. Very few business men fail to take out insurance of their property and their lives.

When insurance becomes universal by law and applies to all people and all losses of a certain kind, it becomes what is known as social insurance. When it is made universal it becomes easier of application because the losses of all people are more easily measurable than those of voluntary groups.

We have come to recognize the fact that when the people of an entire state are subjected to certain risks which are measurable, it is good business to organize insurance through the instrumentality of the state, measure the risk and pay the losses which happen at random to this individual or that. We have used this principle for many years without recognizing it as social insurance. Nearly every state provides a fund by the taxation of dogs, from which the losses to sheep-owners are paid. We have established the principle in insurance of bank deposits now in force in a number of states whereby a fund is collected from the banks in order to pay the losses to depositors through bank failures. Still later, we have applied in some states the same principle by the collection of funds from a tax on agricultural lands to pay the losses from hail. North Dakota and South Dakota have done this on a state-wide basis as have also some of the Canadian Northwest provinces.

Lastly, we have recognized that state-wide insurance of laborers against accident is a simple, practicable and certain way of distributing the economic shock of accident. In a few states this principle is applied through the creation of a single state fund from which the unfortunate victims of accidents draw a part of their compensation and are provided with medical and surgical care.

These simple statements of the application of the insurance principle voluntarily and also on a social basis are made here for the purpose of clarifying our thinking at the outset on the subject of health insurance. They are too often overlooked. Some folks would make us believe that the proposal for social health insurance is some new, absurd proposition which has been evolved in fantastic minds, when, as a matter of fact its coming is nothing but the evolution of sound social and business sense. Health insurance proposes to collect a fund from which the loses of sickness can be partly paid and medical treatment provided on a universal scale. The only problems involved are the measurability of sickness and the organization of the scheme.

We have plenty of evidence from every quarter to show that sickness is measurable. We know with fair certainty how much severe sickness will occur in a large group of people every year. We know what that loss entails in the way of lost wages and we can readilymeasure what the necessary medical care will cost. In fact we know far more in these respects about sickness insurance than we knew about accident insurance

when workmen's compensation laws were put in force, and we know infinitely more than the people who started fire, life, marine, casualty, fidelity and burglary insurance ever knew about the losses from these causes before they successfully established insurance.

In fact, we have a very good measure of the amount of sickness which occurs in any normal group of working people. All the evidence, which appears to be overwhelming, shows that each worker suffers about nine days sickness every year, and that $2\frac{1}{2}$ to 3 per cent. of the people are sick at all times. The findings of the Health Insurance Commissions of Illinois, Ohio, Pennsylvania and Connecticut, from a study of 131,000 cases of disability, showed that 20 per cent. of the workers suffer a disabling sickness every year, lasting for more than seven days. These figures show that the cases of sickness lasting more than seven days averaged about 35 to 37 days each. These figures are borne out by innumerable investigations and particularly by the study of the Workmen's Sick and Death Benefit Society made by the United States Department of Labor Statistics, by the studies of the Federal Industrial Relations Commission and of the United States Public Health Service.

Not only do we know how much sickness occurs in the group but we know with fair exactness how this sickness falls on the different people in the group. It appears that 20 per cent. of a normal group will suffer a disabling sickness lasting more than a week; that about 65 per cent. of those that are sick will be disabled for less than 30 days; that nearly 20 per cent. will be sick for four to eight weeks; that 6 per cent. will be sick from eight to twelve weeks; that 3 per cent. will be sick for more than six months and 1.3 per cent. for more than a year.

We know further that sickness varies with age and that it falls more heavily as men grow older. The exact figures as shown by the Workmen's Sick and Death Benefit Society are as follows:

TABLE

Cases of sickness lasting more than 7 days

Age	*Average Compensated days*	*Length of time each case lasts*
20	3.0	22.9
25	3.1	29.4
30	3.7	32.6
35	4.8	39.6
40	4.3	35.0
45	4.5	35.1
50	5.6	39.1
55	7.1	44.0
60	8.6	49.5
65	9.1	49.4
70	15.1	65.9
Total	5.1	38.0

We know, too, that sickness varies according to occupation, in some occupations rising to two and three times the rate of other occupations. We know also that there are some variations according to sex. These

facts we know with fair exactness. They are not disputed by any intelligent and honest person.

We have then, here, the proper basis for the establishment of an insurance system. We know pretty nearly how much sickness there is going to be among a million people. We know very nearly what the sickness will cost. All we need to do is to apply the same principles which we have already applied in other respects and provide for the distribution of the burden of sickness on a communal basis. It is not a leap in the dark. It is not a blind attempt to do the impossible. It is simply the application of well-known and well-established business principles to the solution of the problem which hangs as a cloud over the lives of the people. We know how much sickness there will be in a group, but we do not know upon which individuals the cost of sickness will fall.

What are the plain results of sickness? It hardly seems necessary to repeat them in this presence, and yet there are those who would deny even the simplest truths when those truths are inconvenient to them.

Sickness drives people from a higher to a lower standard of life. It drives people from independence to dependence. It keeps thousands on the brink of poverty and it keeps millions in the fear thereof. When the wage earner is taken sick, his wages stop. Rarely are wages paid beyond the hour when the man quits work. But his expenses do not stop—they go on and increase. To them are added the cost of medical care, if the man does not immediately seek charitable aid. Slender resources are soon used up. Everyone who appears to have the slightest presumption of knowledge is very well aware that the rank and file of working men are only a brief space away from economic distress. Perhaps the man has some personal credit or some helpful friends, but even the benefits of these are soon used up if the man happens to be one of the million and a half who are sick for four to eight weeks, or of the 230,000 who are sick for more than six months.

The next resort is the chattel loan. Here we find that 35 to 50 per cent. of loans are due to sickness. The next resort is the associated charities. Here again we find that 35 to 50 per cent. of applications are due to sickness. The last resort is outdoor public relief, of which we have very little satisfactory statistical evidence. We found in Ohio, however, that 30 per cent. of the people in county infirmaries had been reduced from independence to dependence by sickness, resulting in their going to the poor house and that 40 per cent. of the old people in private homes were there because of the calamity of sickness at some time in their lives.

Workers among the tuberculous must have seen the numerous cases of the workings of sickness in forcing individuals and families downward. No better illustration of the possible benefits of health insurance could be given than by a case of tuberculosis. Within a short time accumulated resources are used up, and long before death relief must, in most cases, be obtained from some quarter. Men are unable to leave their work to secure treatment because they must depend upon their daily wage. They are practically condemned to death by their inability to take preventive measures.

There can be no solution of the problem of tuberculosis among working men without health insurance. Men cannot stop work long enough to take treatment because, as is well known, the great mass of working men are living only a few days or a few weeks away from actual want. Some means must be devised to enable people to stop work and to receive adequate medical treatment. There are only two possible ways to do it—one, through charity; the other, through health insurance. Between these two there can be no doubt as to the choice which should be made. Health insurance is the independent self-respecting way to handle the problem. Under an adequate system a man provides for himself through coöperation with his fellow men. He is entitled to cash benefits and adequate medical care if he happens to be the one who suffers a disability.

Tuberculosis is one of the most serious burdens which health insurance would have to carry. Long disabilities result and a large percentage of those who are stricken with disease are driven, under present conditions, to actual poverty. A plan of health insurance to take care of the tuberculous should provide for payments without limitation as to the number of weeks and should make it possible for a man to have complete medical and sanatorial treatment as long as he may need it.

Sickness is the road along which thousands travel every year downward toward the pit of poverty. Men who depend for their living upon their physical powers must necessarily deteriorate when those powers fail. It should be the object of society to maintain, as far as possible, the physical fitness of men and to prevent sickness from dragging men down.

The United States Supreme Court, speaking on the subject of accidents, said: "One of the grounds of its concern with the continued life and earning power of the individual is its interest in the prevention of pauperism with its concomitants of vice and crime, and in our opinion laws regulating the responsibility of employers for the injury or death of employees arising out of the employment bears so close a relation to the protection of the lives and safety of those concerned that they properly may be regarded as coming within the category of police regulations." This was said regarding accidents, which all accounts agree are responsible for only about one-seventh as much economic loss and consequently of economic distress as sickness.

Health insurance merely attempts to stop the steady decline of people from a higher to a lower status. It is intended to insure people who are now independent and to keep them from going the downward path toward the brink of poverty. No one can study the figures on this subject and reflect upon current observation without being convinced of the necessity of something to prevent the decline in human values.

The question is raised at this point: "Why make it compulsory—why organize it on a universal scale? Why not leave it to voluntary action?" The answer is simple. If it is left to voluntary efforts it will cost far more than it would as a social enterprise. The cost would in fact be more than doubled. We have the example before us of the burial insurance companies which have been insuring people against a pauper burial on a voluntary scale. They probably manage their business well—

no one has lately charged them with a lack of efficiency. During the last three years they have collected $448,000,000, and have paid in death claims $148,000,000, or about 33 per cent. of the amount collected. The people have paid for the privilege of voluntary burial insurance in the last three years the sum of $300,000,000 over and above what they were paid for burials. The casualty insurance companies on a voluntary basis have collected in the last twenty years $402,000,000 and have paid in losses $175,000,000. Nearly 56 per cent. of this enormous sum goes for the privilege of regaling ourselves with voluntary insurance.

Workmen's Compensation Insurance Companies in the last five years have received $125,000,000 and have paid $55,000,000. Mutual Workmen's Compensation funds have received $17,000,000 and have paid $7,000,000. Commercial Health Insurance Companies in fifteen years have received $74,000,000 and have paid $33,000,000.

These huge sums of money have been sacrificed to the principle of voluntary insurance. Set over against them is the record of the Ohio Workmen's Compensation Insurance Fund, operated on a state-wide compulsory basis, which shows a charge of $3\frac{1}{2}$ to 5 per cent. for the conduct of the business. A pencil and a piece of paper will very quickly tell you what we have paid for the privilege of having voluntary insurance. Universal social insurance removes the cost of solicitation, removes the profits of insurance carriers, removes the absurdly high salaries of insurance officials, and in many ways makes the money of the insured go further in providing him the benefits which he needs in a time of calamity.

The extent to which voluntary health insurance is now purchased is the best evidence of its probable failure to meet the need for universal insurance. Only about 33 per cent. of the workers carry any health insurance. Such insurance as is carried amounts to from $5 to $7 a week for about thirteen weeks and practically no medical service. In the United States only about 3 per cent. to 5 per cent. of losses is distributed by health insurance. There is no evidence that outside of the larger establishment funds, medical and cash benefits can ever be so combined and organized as to be effective.

The facts of the case from beginning to end, with scarcely a single exception, point to the desirability of establishing a state-wide human depreciation fund by the collection of premiums from those who are responsible for sickness and for its care. We know now who those parties are. It is perfectly clear that industry is responsible for some diseases, the individual is responsbible for some and the community is responsible for some. It is equally clear that two or more of these factors combine in certain other cases to cause sickness. It is perfectly clear that the line cannot be drawn where industrial responsibility stops and individual responsibility begins, or where the community responsibility begins or ends. Tuberculosis, for example, is caused by a combination of two or more of these factors. A study in Cincinnati by the United States Public Health Service indicated that in 442 cases 18 per cent. were due to industry; 32 per cent. to heredity; 10.8 per cent. to intemperance and vice;

9.7 per cent. to housing and the rest from undefined causes. This is merely illustrative of the inter-relation of causes of sickness. No one can honestly say or believe that industry and the community should not share with the individual the cost of sickness. We have, theretofore, put the principal burden—in fact, practically all of it—on the individual. It is time that our social conscience be awakened from its slumber and having taken cognizance of the awful consequence of diseases, that we shall join in a large coöperative undertaking for the creation of a fund through the payment collected from causative factors, so that the burden of sickness shall not fall as it now falls—upon the individuals who happen to be sick and at a time when they are least able to bear the extra burden.

It seems almost incredible to believe that any one would here raise the question of cost. It seems absurd to mention it in this paper. There are thousands, however, who make the absurd claim that health insurance will be so costly as to overwhelm us. Figures are cited to make this loss appear even more excessive than it is. How child-like the simplicity of such people. If sickness is costing two billion dollars today, somebody is bearing it, and who is that somebody? If the burden is too great for the whole society to bear, it is a pretty fair evidence that it is altogether crushing for the few who must now bear it. If it be true that health insurance would cost too much, then the social order is bankrupt. It is even worse than bankrupt because it compels the weakest portion of society at the time they are weakest to bear the impossible burden which it is claimed cannot be borne without serious disaster by society as a whole. Such arguments reduce to absurdity. Health insurance means the redistribution of a burden which now falls unevenly. It does not cost money, it distributes cost already in existence, and it does it without doing harm, as has been shown in all countries, even our own, wherein we distribute certain burdens by means of social insurance. The load of sickness is comparatively easy to carry when it is distributed over the whole body. The soldier who would attempt to carry his burden attached to his feet would not get very far.

It is said that the system has failed in Europe: that it has caused the people to resort to the fraudulent practices of malingering: that it has not reduced the amount of poverty: that it has resulted in cheap medical service and has in other respects been a failure. It would be futile to go into the arguments at this time to disprove these assertions. That they are mere assertions based upon the present antagonism of things German no one can doubt. I have in my pocket excerpts from the addresses of leading opponents of health insurance, including Frederick L. Hoffman, of the Prudential Insurance Company, and Lee K. Frankel, of the Metropolitan Insurance Company, showing that before the issue became imminent in this country those gentlemen saw none of the dire disasters which they now attribute to the German system of health insurance. Is it possible that a system could have been so perfect in 1910 to 1912 and have been suddenly so reversed? Or was the judgment of these men, after personal examination, so unreliable in 1910 and 1912? Undoubtedly,

the system is not perfect anywhere and probably it would not be perfect if established in this country. Social institutions are not likely to be perfect in an evolving world, but it takes only a modicum of common sense to see that if health insurance is organized so as to provide for cash benefits and medical care for all employed persons, there will be fewer people who will annually sink into economic distress or poverty.

It is said that the scheme is paternalistic and socialistic: that it saps the independence of men and makes them tend toward dependency. Until it is proven, however, that the agencies for common welfare, such as compulsory education, free schools, workmen's compensation for industrial accidents, public health legislation, are disastrous to individual initiative and independence, I am inclined to agree with the statement of Dr. Royal L. Meeker made about two years ago regarding this very subject. Dr. Meeker said: "Many earnest people are afraid that social insurance will take away from the workingman his independence, initiative, and self-reliance which are so celebrated in song and story and transform him into a mere spoon-fed mollycoddle. This would be a cruel calamity. But if the worst comes to the worst, I for my part, would rather see a race of sturdy, contented, healthful mollycoddles, carefully fed, medically examined, physically fit, nursed in illness, and cared for in old age and at death as a matter of course in recognition of services rendered or for injuries suffered in performance of labor, than to see the most ferociously independent and self-reliant superrace of tubercular, rheumatic and malarial cripples tottering unsocialistically along the socialized highways, reclining self-reliantly upon the communal benches of the public parks, and staring belligerently at the communal trees, flowers, and shrubbery, enjoying defiantly the social light of the great unsocialized sun, drinking individualistically the socialized water bubbling from the public fountain, in adversity even eating privately the communistic bread provided in the community almshouse, and at last going expensively to rest, independently and self-reliantly, in a socialized or mutualized graveyard full of little individualistic slabs erected to the memory of the independent and self-reliant dead."

DISCUSSION ON PAPER BY MR. LAPP

Dr. C. V. Craster, Newark, N. J.: All of us who have been brought into contact with the administrative side of public health work must acknowledge the seeming helplessness of our present means of handling tuberculosis.

The disease has been variously viewed from time to time as a harmless family affliction, known as a decline, so familiar to us in our Victorian novels, and later as a contagious communicable disease of such moment to the community as to bring about undoubted panic in certain cases of scare known as "phthisiophobia." Both these attitudes of mind have been productive of harm to the community, although both perhaps inherently contain elements of truth, inasmuch as we know that tuber-

culosis can be as harmless when properly treated and regarded as it is dangerous when known safeguards are not applied.

In the average community tuberculosis exists at this time to the extent of two per cent. of the population. Although the disease has decidedly decreased in prevalence during 20 years it is still the most frequent cause of death throughout the year. There are few diseases with so long and protracted a period of disability before termination and which when cure is established leave a more weakened physique. It is certain that between 20 and 40 years it is the only important disabling cause.

It is the very duration of this disability which places tuberculosis in the unusual position of causing profound alteration in the domestic status of the patient and his family. The ability to make a living gradually decreases, work becomes spasmodic, and one by one the family effects are sacrificed for the needs of the family. The average worker even with savings in the bank soon reaches the end of his tether when attacked by tuberculosis.

There is a disinclination to accept proper treatment in a sanatorium when offered, for the reason that anxiety for the family needs obscure the personal view. The patient thinks of the family and their condition without his help, and who can blame him for sticking to it to the last and dying in his tracks?

It is along social help lines that our anti-tuberculosis work has been weakest. It is easy for us to talk about education and prevention and all the rest of it, but there is a total lack of "get up and do something" in anti-tuberculosis campaigns as we know them.

Tuberculosis is a social problem as much as one of medicine and public health. There will be no solution of it until this point of view is realized and brought home to us in our active work. The tuberculous patient is an indigent citizen in 95 cases out of a hundred and needs assistance from the state as much as he needs medicine and open air. The family of a tuberculous person is a direct responsibility on the community which has never been taught to realize where the blame lies. The patient did not ask to be tuberculous, his condition being the direct result of an exposure to conditions he was not personally responsible for. He is the victim of a disease which we as a community should have protected him from. He can justly demand that we take care of him and his until he is made a responsible and healthy worker again.

If tuberculosis is a hazard to which we are all more or less exposed and if from present appearances there is as yet little prospect of its eradication as a disease menace, then there is something to be said in favor of a form of insurance against tuberculosis alone whereby those becoming tuberculous would have the support of an insurance fund. This could be arranged to care for the patient himself and send him to a sanatorium and also support his family during his absence, whatever its length might be.

With the present machinery for providing county sanatorium accommodation some form of State Insurance could be incorporated.

The position of the tuberculous dependent has not been as freely dis-

cussed as it should have been. Much has been said and done for the patient and nothing for the family of dependents. This omission to realize the social problem in tuberculosis will always make our activities nearly valueless.

Every patient has a family problem to solve and in nearly every case it is one of livelihood. There is a perfect willingness, even anxiety, to accept any form of treatment for the disease provided that an assurance of the family being cared for can be given. Our social agencies have no funds to relieve the number and variety of their own calls much less to attempt the relief of every tuberculous family. The Poor and Alms Departments of cities are too much wrapped up in red tape and "Bumbleism" to be a real factor in relief even if the patient himself would descend to such a depth of degradation as to be branded as a pauper.

Some radical changes are necessary in the handling of tuberculosis if there is to be any prospect of success in making this disease a back number in modern life.

The tuberculous case must be handled not as a charity, nor as a contagious disease, but as a break in the links of our modern living methods which we must bend all our endeavors to repair. The tuberculosis case is not due to any fault of the patient, but is a direct blot upon our community living methods which allowed a citizen to contract a disabling and frequently fatal disease.

In New Jersey at the last session of the Legislature a bill was presented calling for an appropriation of $50,000 to be placed in the hands of the State Department of Health for the purpose of providing for the dependents of tuberculous families. The fund was to be accessible to any family in the State whose condition was certified to by the local Board of Health. The amount of relief intended to be paid was five dollars per week for each adult dependent and four dollars per week for each child under 14 years. This bill was presented too late to be placed in the appropriation bill for the State so that its passage was not pressed. A similar bill will be presented next year when we hope to have the measure become a law in the State.

Given the relief of home conditions I feel that the problem of tuberculosis will be in view of elimination. The final end, however, must depend upon the energy with which provision is made for sanatorium treatment of all cases of tuberculosis from the youngest to the oldest, this to include the establishment of adequate preventoria for exposed children.

There has been a large expenditure of money for every purpose since the world war began. It will require very lavish expenditure for the eradication of tuberculosis. The problem has been only investigated so far; the fight to a finish has yet to come. May we realize that it is time to work by legislation or otherwise to get this pestilence eradicated from our midst.

Karl De Schweinitz, Philadelphia: Would Mr. Lapp be willing to explain some of the details of the Health Insurance Bill introduced at the last session of the New York Legislature?

James H. Pershing, Denver: That is exactly what we want. We have learned that 2 and 2 make 4, but we want to know how this insurance is to operate. Perhaps all of you know but I do not. Is this coöperation to be voluntary or enforced? If enforced, by whom? Who is to provide the funds? How are the premiums to be contributed? That is what I would like to know.

Mr. Lapp: I understand now that the case for health insurance has been proved, and we are going to set up an exact form and put it into operation. I thought it was going to be more difficult to prove the case for general principles, but now that we have that all accepted, and I suppose that everybody agrees with me, we want to see how it works,—the definite plan of health insurance organized under the bill which we have in Ohio, all of which is based on the Model Bill.

The Model Bill was the first one drafted in this country. It was a tentative bill and was put forth for the purpose of discussion to get the reaction of the people who knew something about health insurance and to see whether a perfect bill could not be worked out. The bill has been worked on, and new ideas have come from various corners and various suggestions from different persons in the last two or three years. Now the doctors are beginning to make suggestions, but the employers have not got to the point where they see the necessity of it; some are fighting this thing; some are fighting it to the last ditch, and when the time comes health insurance will be passed in spite of the employers and they will not have anything in particular to say about the way it is organized. They have not come forward with their suggestions, but the American Association for Labor Legislation, and others who have been investigating the subject, have had suggestions from a great many quarters and this bill now represents the consensus of opinion thus far. No one considers it perfect. So much for the original organization of this plan. It provides in the New York bill and also in the Ohio bill that every person covered by it must be insured; it is compulsory; otherwise, it would not amount to anything. Without compulsion some would be insured, just as they are now, but those who need it most, those who have the least surplus would be less likely to get insured, and as a result we would have exactly the same situation as before. Moreover, if we had voluntary insurance, which the burial insurance people talk about as being American in its form, you would be paying twice as much to collect the premiums, and pay the cost of administration as you would to put compulsory insurance in operation. Every person who is employed, not the unemployed, not those in poverty, but those who are employed, should be compulsorily insured, by a collection of a part of the premium from them and a part from the employers.

Mr. Pershing: What part?

Mr. Lapp: One-half from the employers and one-half from the employes with the general expenses of administration paid by the state. We expect the state also to provide hospitals and sanatoria which would put their part of the burden up to quite a figure, but I mean the actual

distribution of cost of relief, cost of payments of benefit and cost of medical care would be paid fifty-fifty, by the employer and employe, and collected through the payroll.

Now the carrier of this insurance is the industry itself,—an establishment fund—if the industry is large enough, or a group of industries coöperatively. The rest of the people in a given community belong to a geographical unit. There are thus two funds in any given community. Here is an industry employing, let us say, 500 men. They form one unit for their mutual insurance, just as many do now. Those that are not in that fund form a geographical unit for their insurance. The money is collected and paid over to the proper fund. It is exceedingly simple when you analyze it. Each one of these units runs its own affairs. It is a mutual enterprise which makes its own arrangements, of course, with the approval of the state commission, which fixes minimum standards under which the funds act. They are the same as a mutual insurance organization. The geographical unit would do the same thing. Each fund looks after the prevention of malingering; the members visit the sick; they see to it that a person is not on a sicklist when he ought not to be. They do this all themselves as a mutual enterprise.

So much for the insurance; that is the principal thing. The State Commission has certain supervisory powers; they look after the minimum standards; they see that adequate provision is made for medical care; they see that people come up to the standards; that they do not disobey the law, just as they now supervise the private insurance companies. Now for fear that some small group is not large enough to stand the risk, for fear they might have a few cases of tuberculosis, let us say, in one small fund, which might disrupt the whole thing, the Ohio law makes a single re-insurance fund in the state in which every one of these groups is re-insured so if they have any long cases like that it is distributed over the whole state, rather than borne by the small single fund. That makes it secure for everybody so that they will not be swamped by long chronic cases. It enables us to pay benefits to the insured for a year, or even longer. The Ohio bill provides for a year and authorizes the different groups to re-insure for longer periods if the sickness lasts for more than a year.

Now in regard to the question of medical care: How we are going to organize it is the crucial problem. There has not been enough discussion of the subject, there has not been enough clear thinking on the possibilities. Too many physicians have been opposed and misled by the argument that has been handed out by some of the burial insurance companies that it was going to destroy the medical profession, positively destroy every possible desire to be a physician, take all the heart out of a physician, do away with all research work and practically put the physician out of business.

The latest proposal along this line and one which was incorporated in the New York and Ohio bills is that, in organizing the medical care in order that the doctors shall have a hand in it, to see that their best

interests are protected, if they desire, the state commission sets forth the minimum standard at a given time in the year. This is submitted to the county medical societies which are in most states an incorporated body. The county society suggests, after discussion, a plan of medical service which they think would work in their county, and they submit it to the state commission, and if it meets the requirements of the state commission it is adopted by the state commission. If the plan for medical service, the rates of compensation, etc., are not approved by the state commission the commission submits its own plan and the local society is allowed a hearing, and if after a hearing they are not satisfied, they have a rehearing and if then they are not satisfied, they may appeal to the State Supreme Court. The doctors in the first instance formulate a plan that they think would work in their given community, then they are given a chance to have a hearing before the state commission and are then given a chance for a rehearing, and finally an appeal to the State Supreme Court to see that they receive adequate justice, and we believe they ought to be interested enough to take the initiative and to formulate a plan which would be satisfactory, including as I said, the rates. Then when this thing is in operation and a man is taken sick, he is entitled to medical service from the first day and after he has been sick seven days he may draw cash benefits. I would rather have a long waiting period and then have the payments continue throughout the disability than to have a short waiting period, because a man is not going to fall into economic distress or destitution in three, six or seven days. When a man has been sick seven days under this plan he is entitled to cash benefits and those cash benefits are paid from the fund in which he is insured. The man may go the moment he quits work to his doctor, the one who is taking care of his case by his own choice; he can go to him for medical care just as soon as he feels sick. If he is quite sick he is entitled to have the doctor and a visiting nurse come to his home, and he is entitled to go to a hospital, and the bills are paid by the fund after they have been duly verified. So in the final analysis it is nothing but the simple working out of a business coöperative principle by which this risk is combined and the money is provided to meet the cost when the time comes, and when the time comes the money is there to pay the bills.

The proposed bills fix a maximum weekly allowance not exceeding eight dollars in New York and twelve dollars in Ohio. This may be small and probably will be small if the cost of living continues to go up. It is not considered adequate. It is supposed to be just the minimum amount to prevent that man from actually needing other relief. It was put in the New York bill at eight dollars per week for the reason that a great many of the men carry small policies in fraternal and labor organizations, five, seven, or nine dollars a week, and in the New York bill, which is backed by the New York Federation of Labor, it was thought best to limit the cash benefits under the plan to eight dollars a week so as to allow the man to carry a five dollar, or seven dollar or nine dollar policy in fraternal orders, which would allow him fifteen dollars or seven-

teen dollars a week cash benefits, and to centre everything upon medical care, making sure that the entire cost of that is paid.

A Delegate: I would like to ask what would happen in case the wife or some one else in the family was sick, and also what provision is made for migratory and irregular labor.

Mr. Lapp: The bill provides for medical care of the family as well as for the man himself. There is a constitutional question involved in that which may make it necessary in some states to limit the care to the man himself. You have a clear connection in the case of the man, because the employment has something to do with his sickness—employment does cause some sickness—therefore you can put part of the burden on the employer for that man's sickness, but it is rather a far cry at the present time to care for the man's dependents under that same theory. When we have the theory of the minimum wage thoroughly established in the courts, by which we consider the minimum wage to be the wage which is sufficient to take care of the man and his family, including the cost of sickness, then we will have recognition of this clearly. At the present time the bills provide for medical care for the family.

In regard to the problem of the migratory workers, that is more difficult. The bill provides generally for the State Commission to make rules and regulations to bring the migratory worker under the insurance system. If a man goes from one employer to another—in the state to-day and out to-morrow—it is very difficult to keep track of him. It is the intention of the law to cover him. I cannot explain definitely here how it would be done, because it would be a matter of very great detail. However, we are not so concerned with him as we are with the great body of working men who work day by day. Insurance is continued during the time a man is sick, and during other contingencies, if he is out of employment. In the case of unemployment, if he has been in the fund once, it will be continued by the provision of the act, so he does not lose his insurance just because he loses his job for awhile, as long as he is not permanently unemployed.

A Delegate: You said the New York bill was supported by the Federation of Labor. You mean not the American Federation of Labor but the State Federation of Labor.

Mr. Lapp: The State Federation of Labor.

A Delegate: Has there been any pronouncement on the part of the American Federation of Labor?

Mr. Lapp: The American Federation of Labor has considered the question for some time. Some years ago they opposed compulsory insurance and then they did nothing about it for two or three years. Last year a report was submitted by the Executive Committee urging the necessity of studying this question and a committee was appointed which was to report at the present session of the A. F. of L. The committee, I understand, will merely ask for time; they are not ready to report. And they ask for a continuance of the committee. A large number of internationals, and nationals, and state federations have declared favorably, but in the one place where it has been brought up actively, in the state of

New York, the bill is fathered by the State Federation of Labor, and the campaign of pushing it is in their hands, in coöperation with the women of the state who have made it a part of their program. The first time that a legislative bill ever came to a vote in any state on this subject was last winter when it was passed by the Senate of the State of New York by a vote of 30 to 20, and would easily have passed the Assembly except for the strong arm methods in the Assembly.

Homer Folks, New York: I want to ask Mr. Lapp if he knows how the local bureau that has charge of the local fund is to be selected; whether that is not a real critical point and is it not possible that those that do come in may not be particularly intelligent or particularly efficient?

Mr. Lapp: The governing committee of each one of these units is to be selected by employers and employes, each one selecting a certain number, and jointly selecting others which constitute a governing board. It is possible under any democratic scheme of selection we might have some difficulty, but I cannot see any work which that committee would have to do in which it would be possible for them to violate any of the principles of the health insurance act. They might not be as liberal as they ought to be and they might not do all that they ought to do in sickness prevention and education, but there is always over them the supervision of the state health insurance commission, which ought to result in their being kept up to at least a fairly good standard.

Mr. Pershing: Will you explain why you place any percentage of the burden upon the employe?

Mr. Lapp: It would be difficult to say that all diseases were from sources outside the employe. It is not like the Workmen's Compensation acts where the accidents are really incidents of industry. Sickness is not entirely an incident of industry. Part of it is caused by individual carelessness and vice. When you come to discuss the question in terms of that you see why it is necessary to take part of the burden off industry.

Mr. Pershing: Why 50 per cent.

Mr. Lapp: As near as I can figure, after having spent a couple of years at the job of analyzing the causes of sickness as they are related to industries, that is in my judgment a fair division.

Most of the argument, however, is on the other point. Why do you put anything on industry? Of course industry is responsible for some, and furthermore industry is responsible for a living wage to the men and that living wage includes the cost of sickness.

A Delegate: I would like to ask if there is any method of forcing the physicians to go on the panel?

Mr. Lapp: They talk about that in Germany. There are some who suggest that the doctors should go on strike in this country. But that is probably just mere talk. No doctor will be forced anywhere to go on the panel if he does not want to. But I judge under a scheme, well worked out, that it would be unnecessary to force any doctor to practice. If we have adequate medical provision worked out every doctor will be glad to practice under it. We have doctors now who refuse to practice under the

Workmen's Compensation Act. In Ohio we have numerous doctors who refuse positively to take a case.

The Chairman: I am sorry we cannot continue this discussion longer this morning. I think a great many people would like to ask some questions, and we will continue the discussion at the afternoon session.

Before all our states get health insurance or social insurance we must provide some sort of relief to our families and I am going to ask Mr. Ufford to close this discussion of the topic as to what we can do until we get this insurance.

Walter S. Ufford, Washington: I think as we proceed we must use existing machinery but try to make that machinery more effective and far reaching. The mothers' allowance laws may help solve our problem, as well as social insurance. We must stand for adequacy of relief. Our approach to the community may have to be on the basis of self-interest—that we are working for the community's own protection. I believe that argument will carry further in securing legislation than an appeal based upon the welfare of the individual patient and his family. On the other hand when you are raising money for a charitable organization the direct individual appeal is the stronger and will bring more money, but in a crusade to create public opinion in a general policy of prevention and relief the appeal is more effective where it is directed to the self interest of the individual tax payer.

W. H. Davenport, Niagara Falls: I have had an opportunity at Niagara Falls to talk to some of the employment managers and to one or two of the executive heads of those plants on the matter of the New York bill. They do not seem to oppose it as much as the doctors do. I was much surprised to see how liberal they are. I will confess it has taken a great deal of thinking on my part to see just why the man who is running a chemical plant, we will say, should be taxed for the very elaborate arrangements which are made for maternity benefits for the wives of employes. The employer certainly has nothing to do with the children as they come into the families of his employes. I had a very interesting conversation with one of the foremost medical men in western New York on that bill, a man who has thought a good deal about it. He raised what seemed to me more or less fundamental objections. This bill provides that the Buffalo Medical Society is to set the price to be paid physicians for their visits. He said, "Do you suppose I am going to let them tell me what I am to charge my patients when they come to see me?" This brings up another point. If all your doctors should be put on the same level, as they are bound to be if any medical society or anybody else is going to set these standards, you can readily see what would happen if any organization would attempt to say that one doctor's services were worth more than another. Under this insurance fund, if all these doctors are going to be put on the same basis, the specialists are going to be literally swamped, because people can get their services for the same price that they can get the services of the youngster who may be just a year or two out of medical school, and knows very little in comparison with the man who has had years of experience and stands at the top of his profession. Those are two or three of the points

brought out in this discussion, which seems to me to be very fundamental, and on which I would like Mr. Lapp to enlighten us.

The Chairman: Are there any other questions?

George S. Wilson, Washington: Would the small storekeeper be provided for, the man who conducts his business himself and has no employes, and whose income would stop if he became sick?

Mr. Folks: I would like to ask one more question. The trend of modern medicine seems to be toward group diagnosis. The number of physicians who really know how to make a fairly accurate and exhaustive diagnosis is rather small, and to get that you have to have the joint opinion of several specialists before you really find out what is wrong. Of course, if you don't know what is wrong, you do not make so much progress toward curing it. Now that is the feature of medicine toward which it seems to me I have been inclined to look with most hopefulness,—an organization of the combined resources of different kinds of specialists who find out what is wrong in the first place. Is there anything in the plan which in any definite way and a concrete manner heads in that direction?

Mr. Ufford: Does it take in the teachers?

Mr. Lapp: Let me answer these specific questions. First, it includes all employes, including public employes, the same as anybody else. They sustain the same relationship. It does not include the small shopkeeper because we have to apply the same principles there as in Workmen's Compensation, and he is not covered under Workmen's Compensation. In order to have this work at all it must work on the basis of the relationship of employer and employes. When you sustain the relationship of an employe you come under the act. Now I admit the individual ought to be taken care of, but if he is an employer himself, you can give him the chance of being insured voluntarily; he will probably take it. At any rate that man is not going to be in as great danger of sinking into poverty as the man whose pay stops the hour that his work stops. He has some resource generally. But as a matter of practical administration it could not be done.

Mr. Veiller: Is there a definition on a money basis as to how much his wage earning capacity is?

Mr. Lapp: No. The New York bill makes a few exceptions in the case of managers, superintendents, presidents, etc. The original bill introduced unfortunately fixed the limit at $1200, which seems to give one the idea that this was a sort of minimum wage insurance. There ought not to be any limit because, as I pointed out in my address this morning, a man earning $1500 or $1800 is just as much in danger if he suffers along disability.

There is a misapprehension, it seems to me, about the relationship which the employer sustains toward the health of his employes, particularly the men who are employed in industrial plants. In industry it is foolish to talk about the idea that the employer is not responsible for a part of the sickness. All advanced employers accept this principle because they now provide for a contribution of half the cost to establishment funds which pay sick benefits. The Goodrich plant at Akron pays

the entire expense, not only of the share of the man during the time he is sick, but provides visiting nurses.

Mr. Veiller: Don't you think the employers are acquiescing in it because they can load in onto the industry?

Mr. Lapp: Let them pass it on. They ought not to object to it if they pass it on.

Mr. Veiller: I do not think they will object.

Mr. Lapp: This is a very vital point in the matter. You say there is no connection between the sickness and the Workmen's Compensation. If you want the explanation of that read in the Ohio report that particular chapter on the liability for sickness. I cannot go into the details in full, excepting this: In accidents, you put part of the burden on the employer, not the whole, but a large part of the burden. We consider the industry responsible for the accident and yet the man has to stand much of the loss himself. We pretend we put it on the employer, but the employes stand about two-thirds of the cost; in the case of sickness we put half on the industry. Now what are the ill effects that are caused by industry? Four million workmen in this country are working in a dusty atmosphere, so dusty as to make it a very serious health hazard, resulting in a large amount of tuberculosis. That is one hazard. Then there is the heat hazard, the poison hazard, the fatigue hazard, the exposure hazard, the nervous hazard. These affect all organs of the body, and degenerative diseases result from the combination of these things in industry. Take the matter of telephone operating for girls. No human being can do telephone operating for eight or nine hours safely; and yet industry takes the nervous force out of the girls by long hours. Industry has secured dividends out of nervous force. Why also should not industry pay for lost eyesight? If a man is hit with a chip in the eye and injured, he gets compensation, but if he works in bad light and gradually loses his sight so that he cannot perform his duties we say that is his fault, and let him stand that. Why is not industry responsible for loss of eyesight due to improper lighting just as much as it is for the accident which throws a chip into the workman's eye? In industrial accidents we put a large part of the burden on the employer, and in sickness we put only that portion which we feel is justly traceable to industry and for which industry is justly responsible.

There is one other question that Mr. Folks raised about group practice. I feel very strongly that the tendency ought to be toward group practice. I read a paper at the Health Association the other day in which I tried to point out the outlines of the coördination of groups, on the one side of doctors and on the other side of health officers, so as to get group diagnosis. Here is an establishment fund; they are interested in keeping their men well, they are interested in promoting health in every way, and here is a group of doctors who can give all the types of care, particularly diagnosis. The doctor group contracts with the employer group. I believe that the health insurance measures ought, in their medical provisions, to provide for the promotion of group practice just as far as possible. It is one of the things I should like to have

considered before the next health insurance measure is introduced in New York State, because if we can by that means develop a group practice, then we have secured more benefit than health insurance itself will bring.

As to the question asked by the doctor from Western New York, in the first place, the Erie County Medical Society does not fix the rates. The Erie County Medical Society under that bill merely formulates a plan, with suggested minimum rates, which they say is suitable for Erie County. The State Commission receives the plan, considers it and holds hearings upon it in which all can be heard. The specialists can go before the Commission, they can have an adequate chance for hearing, and afterwards if the physician or specialist does not want to practice under it he does not have to. If he can charge $50, or $100 or $500 and get it, it is his privilege. But if he does any work under the Insurance Law, he can charge only the maximum fee which is the amount fixed, but he does not have to work under the plan. I have a feeling that we have enough justice to see that doctors are not going to be compelled to give the fine service which we know they can give for less than a fair rate. We recognize the value of experts, and I am very sure under any plan you could not think of injuring the doctors. You have to build up the medical profession. You have to give them every chance in the world. Unfortunately in this country the doctors have been excited by false tales. The Burial Insurance Companies tell the doctors that they are going to lose everything by health insurance. In the State of Ohio, when I was conducting the investigation, the secretary of the medical society went around and held meetings of the doctors in all sections of the state. He was trying to be fair in the matter, and he sent out circulars including a German fee schedule to these medical societies telling the doctors that this schedule would allow them 25 cents, 30 cents, 40 cents or 50 cents a visit, and he said, "Do you want this sort of thing? If not, come out to this meeting." Of course they all came out; they did not want a 25 cent fee. But who would think of such a thing as expecting the doctors to work for 25 cents or 50 cents or 75 cents? If the people that are interested in health insurance, and other fair-minded people have any influence at all, the doctors will be given a fair compensation, and if experience in England is consulted, we find that they are going to do better economically.

Mr. Veiller: May I ask if you had good legal advice as to the constitutionality of this measure? I suppose it comes under the theory of police power.

Mr. Lapp: It is supported on the same general principle as the Workmen's Compensation and the minumum wage. We do not know what the court will do, but there is no doubt so far as the constitutionality as to employers is concerned. There is doubt as to whether the court would sustain an act which applies to the employe's dependents, but in answer to that question, I want to say again, certainly if we accept the minimum wage in its broad limits, the minimum wage includes the care of a man's family, and that care includes medical care,

and the cheapest way to provide that medical care is to divide and pay a certain average amount rather than pay the possible abnormal amount in a given case. So it is sustainable from every point of view so far as the man is concerned, and will be sustainable so far as the others are concerned. Of course it will come under police powers. If you want a really good statement of it read Dr. Alexander Lambert's report in the American Medical Association meeting. It is a pamphlet of probably sixty or seventy pages and sums up the facts for health insurance rather exactly and eloquently.

NURSING SECTION

Chairman

MISS BERNICE W. BILLINGS, R.N.

UTICA

AN INTENSIVE EDUCATIONAL PROGRAM

By MARY A. MEYERS, R.N.
INDIANAPOLIS

An intensive educational program—no better brief description of the work of the Marion County Tuberculosis Association since its infancy could be given, than is expressed in those four words. For from the very beginning we have realized that in no other way could tuberculosis be checked. It is the people who suffer from tuberculosis and it is therefore among the people, all the people, that we must work to bring about the lessening of this disease. In 1913, when the Marion County Tuberculosis Association began active work, the attitude of the citizens of Indianapolis and the county toward tuberculosis was apathetic and resigned. Gradually, very gradually, the public attitude has changed and now there are few grown-ups or children in our county who do not know that tuberculosis is a preventable and curable disease. They know, too, the wonderful value of fresh air and right living.

In August, 1913, the association employed a nurse as its first executive secretary. In the beginning she devoted her entire efforts to arousing the public, in the city and county, to the ravages of tuberculosis, and to calling attention to the limited means for handling the problem.

Our first aim was a county tuberculosis sanatorium. As the population of our county was 340,000, and as there were only 12 beds for incipient and 25 beds for advanced cases of tuberculosis, we began our campaign by having speakers on the programs of all conventions, clubs, labor organizations, business men's associations, etc., to place this information before these various bodies. At the same time we secured the coöperation of all newspapers in the city and county. Before the request for the appropriation was presented to the county council for a vote, 50 organizations officially indorsed the movement. Every nook and corner in the county was visited to encourage the people to write personal letters to the councilmen urging them to vote for the appropriation. The people responded so readily that they nearly swamped the council's office with mail. Of course the appropriation was made. There was considerable opposition to this movement for a sanatorium at that time, but with so much pressure brought to bear the vote was unanimous.

Last summer another campaign was conducted to obtain additional funds for more buildings at the sanatorium. This campaign consisted of newspaper publicity, plenty of it, and personal visits and letters to the councilmen by representative citizens. The minds of the councilmen were made up before the time of the meeting, and an appropriation of $100,000 and a one cent tax which yields $30,000 annually were made.

During this campaign our State Council of Defense was asked to pass a resolution urging all county governments to provide without delay sanatorium and medical treatment for their tuberculous soldiers and citizens, and all county councils of defense were urged to take vigorous and active parts in all campaigns for tuberculosis sanatoria. This resolution had a far-reaching effect. The State Council sent copies to every county council and to all county commissioners throughout the state and this created a new interest among these men. A number of counties voted to build sanatoria as a result of this action on the part of the State Council of Defense, and we know that it helped our county councilmen to decide in favor of the appropriation.

While we were conducting our first campaign for a sanatorium, a portable fresh air cottage was built, equipped and placed on the sidewalk of the post office. Hundreds of pieces of literature were given out and an equal number of questions answered. The cottage was on the grounds almost three months before we were ordered to take it away. We believe this fresh air cottage was responsible for the building of many sleeping porches.

While working for fresh air schools we tried to grasp every opportunity to show the value and need of them. An exhibit on fresh air schools was conducted during our Centennial Exhibit at the State House, from May 10 to 20, 1916. Our own display on fresh air schools along with the wealth of splendid material brought to Indianapolis by the Elizabeth McCormick Memorial Fund of Chicago made a most interesting and instructive exhibit. The McCormick Fresh Air School Exhibit was the one used at the San Francisco Exposition. Lectures on open air schools, illustrated by moving picture films, were given daily from four to six. Literature on open air schools was distributed to teachers and others interested in the fresh air school movement. Letters were sent to all the principals and supervising principals of the city inviting them and their teachers to visit this exhibit. As a result of these letters many teachers and pupils came. The first open air school established in Indianapolis for anaemic children proved to be one of the best educational factors we could possibly have had. The newspapers took a special interest in the results obtained and in this way public interest was aroused to the need of more of these schools.

For the past three years, the State Department of Health and the state and county tuberculosis associations have conducted a health exhibit at the Indiana State Fair. Our last exhibit was housed in three large tents. Tuberculosis, child hygiene, pure food and general disease prevention were the subjects of the propaganda work which was conducted from many different angles. One of the tents was used exclusively for motion pictures. Films on tuberculosis and other health subjects were run continuously from 10 a. m. to 6 p. m. The Indiana Dental Society supplied the speaker on teeth; the Modern Woodmen of America supplied one speaker and their films showing their tuberculosis sanatorium; the State Department of Health and the tuberculosis associations supplied the rest of the speakers. Just as soon as one lecture was finished

the tent was refilled with a new audience, and it was estimated that 5000 people saw this exhibit daily during the five days it was in operation. At least one-third of that number saw the pictures and heard the lectures. The local tuberculosis association had a booth in which was demonstrated the making of a Klondike bed. Nurses in uniform lectured while demonstrating the making of the Klondike bed. Approximately 40 talks were given daily by these nurses on the value of outdoor sleeping. In addition an exhibit on fresh air schools was conducted. The State Department of Health financed most of the exhibit and Dr. Hurty, the secretary, felt that so great a number of people could not have been reached for so small a cost in any other way. Thousands of pieces of literature were distributed. One year, at such a health exhibit, the Metropolitan Life Insurance Company sent us 1100 pounds of literature and supplied a man for the entire week to supervise the distribution of it.

In coöperation with the National Children's Bureau and our local Children's Aid Association, Baby Week has always been observed in Indianapolis. The tuberculosis association with many other organizations provides exhibits on its special line of work. One year we emphasized the need for fresh air schools and for an increased number of special tuberculosis visiting nurses. Another time as our special feature, we advocated outdoor sleeping for children and exhibited a "kiddy-koop" for babies, along with other educational material. In each instance we had a generous supply of photographs, health charts and literature.

In Indiana we have always found the motion pictures and illustrated lectures very effective in our educational work. The state tuberculosis association has always had three or four sets of slides which are in constant use throughout the state but the motion pictures are more effective than slides. Our slides show pictures of open air schools, sanatoria, clinics, visiting nurses, etc. We have used them in talks to foreigners with an interpreter to explain the pictures. The pictures themselves are interesting and the foreigner gets some idea of what you are talking about even if he does not understand what you say.

When we were trying to interest the people of Indianapolis in fresh air schools, we used the films on open air schools frequently. Many times we have rented films on tuberculosis from the National Association to run in local picture houses. We would make arrangements with the managers of the theatres to run the films and the secretary of the local motion picture association would deliver them to the theaters for us.

In the summer of 1917, the state tuberculosis association had a traveling exhibit which was sent to different parts of the state in a Ford. A third-year medical student who was especially interested in tuberculosis was employed to take charge of the exhibit, and Mr. Strawson, the executive secretary, was with the exhibit most of the time. They made a special effort to reach small towns away from interurban lines and railroads. The pictures were shown in the evening on the side of a building. It is very hard to get country people to listen to health lectures without the pictures.

In a Red Cross Christmas seal campaign, next to newspaper publicity,

nothing helps to sell seals more than the motion pictures, for in this day and age when everybody goes to the "movies," you reach all classes with your slides and pictures. In Indianapolis we have always used the Red Cross Seal slides supplied by the National Association in every motion picture and vaudeville house in the city from the last week in October until Christmas.

I believe there is no better way of getting things across, or of creating public opinion, than by the motion picture. If you are putting on a campaign for a county sanatorium by referendum, I would suggest that you have slides run in every motion picture house in the county and motion pictures on tuberculosis in as many as possible. Besides the many films which may be obtained from the National Association, you can get them from the Elizabeth McCormick Memorial Fund, Chicago; from the Modern Woodmen of America; from state boards of health, and local film companies. People do not always remember everything they hear at a lecture but they do not forget what they see, and money spent for the rental of motion picture films on tuberculosis or other health subjects is well spent.

Mindful of the fact that it is hard to change the ways of adults, our greatest efforts have been with the children. In the school year of 1914-1915, talks on personal hygiene, ventilation, and right living were given by a nurse in every schoolroom in the county.

In the spring of 1917 a fresh air or health week was conducted in the city schools. An outline for these talks was prepared by the secretary of our city board of health, and a copy was sent to every physician who volunteered to reach the children in two or three schools. There are 72 grade schools and three high schools in the Indianapolis public schools and every building was reached during this campaign, which lasted ten days. Again the newspapers were generous in their support of our efforts.

In 1915, the state tuberculosis association conducted a state-wide composition contest in the public schools, giving gold and silver medals for the best compositions written by the grade pupils on tuberculosis prevention. A little foreign girl in the northern part of the state won first honors. During this time, physicians, nurses, and druggists throughout the state, were besieged for literature and information on tuberculosis. The parents took an active part in helping to secure material for these compositions. Any educational campaign for children which enlists the parents is worth while.

During Red Cross seal campaigns we have always tried to reach the children with literature, health playlets, health charts and child hygiene exhibits. While the children in the city schools do not sell seals, it is a good opportunity to interest them and the teachers in health matters, because of the large amount of publicity on tuberculosis at that time.

We have four parcel post child hygiene exhibits that are in constant service in the city, county and parochial schools during the school year, and in factories and community centers during vacation. They usually remain in each school building from two to three weeks and during that

time children write compositions on hygiene and sanitation. Special health charts have been prepared in our office for all fresh air schools and community centers.

The largest and best educational campaign ever conducted by our tuberculosis association has been the Modern Health Crusade in the schools during the past year. We have reached every city and parochial school and most of the schools in the county. Some of the schools did not get started in time for the pupils to receive the gold pins. We have had two crusade workers in the schools constantly, one a grade teacher and the other a nurse. In this Crusade movement, we have reached the children and their parents more effectively than in any other health campaign ever conducted in our county. We have received many letters from the parents and teachers indorsing this method of teaching school children personal hygiene.

The Red Cross Christmas seal campaign has unlimited opportunities for educational propaganda. During our 1917 Red Cross seal campaign, 49 churches observed Tuberculosis Sunday; 2000 copies of "Little Benny's Christmas Story" were used in the schools; 49,000 folders were distributed by the laundries in their packages in one week, and 50,000 letter inserts were sent out in the monthly statements of the telephone companies. Our object in having laundries send these folders in one week was to avoid duplication, as not many families get more than one package of laundry each week. The last thing one expects to receive in a telephone bill is an attractive insert telling you how to live in order to avoid tuberculosis. If you can surprise people, they are almost sure to read your message.

We all know that the distribution of literature is a good thing, but the question is, How shall we get it to the people so they will read it? The main point is do not make your message too long; get it up as attractively as possible. Cheap literature will not reach the mark. During the past year, we have distributed the following amount of literature from our office through visiting nurses, schools nurses, tuberculosis nurses, club meetings, churches, schools and by mail:

Pamphlets, "What You Should Know About Tuberculosis"	10,000
Influenza circulars and letters to influenza patients	16,000
Modern Health Crusade chore cards	55,000
Modern Health enrollment certificates	45,000
Roll of Health Knighthood charts	700
Fresh Air School booklets (city, county, and parochial school teachers)	1,000
Miscellaneous literature	2,000

Indianapolis put on a fly campaign this spring. The director of the manual training department of the city schools had charge of the campaign and nearly all organizations doing educational work helped in some way. The Chamber of Commerce as its part of the campaign gave cash prizes for the best compositions in different districts and different grades. Each day all the moving picture houses ran slides which were supplied by the city board of health. Each school building had four minute speakers on the fly. These speakers were pupils, selected from the school, who had memorized their speeches. In this way all the children heard

talks on the subject by one of their own number. Every printing press in the city schools was busy for weeks turning out fly literature before the campaign started. The Junior Red Cross financed this part of the work and the fly campaign was a great success.

Educating the people to the need of certain things is always necessary before you can obtain them, and especially is this true of laws along public health lines. Legislators, as a rule, see the need of preventing hog cholera but they do not always see the need for laws pertaining to health. The Indiana legislature of 1917 passed two laws relating to tuberculosis—the first, compulsory registration of all living cases and all deaths from tuberculosis; the second, county referendum on county tuberculosis sanatoria.

The 1919 legislature created a department for tuberculosis in the State Department of Health with an appropriation of $10,000; a tuberculosis department in the Indianapolis Department of Health, with an appropriation of $27,000 annually for clinics, nurses, housing, inspection.

For nearly three years we conducted a waste paper business but were compelled to discontinue it during the war as it was impossible to get men to work on the wagons. We found this a very good way to get people interested in the work we were trying to do. We had three wagons and six men collecting paper from about 10,000 homes. We were in telephone communication with these homes once each month and many people who never knew about the tuberculosis association began not only to save papers but to take an active interest in what we were trying to do as they felt they were a part of the association. This was also a good way to get literature into the homes. Attractive cards with a picture of a child in a fresh air school outfit were distributed by the drivers. One side of the card told how the waste paper money was spent and advocated more fresh air schools for anaemic children. This interested not only the mistress of the house but her maids as well. Collecting waste paper for a particular cause is a splendid way to get a tuberculosis association before the people, and also a good way to make money.

Publicity of varying types has been one of the most vital factors in all the work that has been accomplished by the Marion County Tuberculosis Association in recent years. Prior to the war the annual Red Cross Christmas seal campaigns formed the basis of the most telling type of publicity, for, by the use of the seal campaign as a vehicle for the dissemination of educational material concerning anti-tuberculosis work, all of the "front-page" value of the seal campaign was made available for the distribution of health conservation material of many types.

As the war came on, other needs for publicity became apparent. The story of the discoveries of the ravages of tuberculosis in the armies at home and abroad made striking educational material for the community, and the coöperation of the newspapers with our publicity department resulted in the giving out of much valuable information to the general public. This publicity resulted constantly in increased interest in the whole anti-tuberculosis program.

The newspapers have, of course, been the chief channels for publicity,

but other lines of communication with the public at large have also been employed. The theory of the publicity department throughout the various campaigns that we have inaugurated has been based on the solid fact that if the newspapers were to print anti-tuberculosis material, it must be prepared as nearly as possible in news fashion. To assist the publicity department in the working out of this theory, the association at all times has attempted to "make news." We seek to use every detail of the actual work we do as a vehicle for publicity. Our meetings are always so planned that some feature in them makes an outstanding bit of news material. All our campaigns for additional anti-tuberculosis facilities in the county are planned from a viewpoint that recognizes that the whole public is, or should be, interested vitally in what we are doing. This basis automatically creates the reason for newspaper publicity and the newspapers of Indianapolis and Marion County have been generous and friendly in their attitude towards our cause at all times. With such support the disposition of the public generally towards anti-tuberculosis work is one of the friendliest coöperation.

Fair dealing between the newspapers in our field is always our aim, and in the distribution of the actual news that comes from our headquarters we seek to keep the balance distributed fairly between the various publications. Much so-called feature publicity material is available constantly through the use of pictures of the children in our fresh air schools, the Modern Health Crusade and similar child welfare movements. Interesting developments from the National Tuberculosis Association, or from associations elsewhere in the country are applied locally in our publicity department, whenever possible. By the use of these and other methods a constant stream of educational publicity is kept running through the public view, and already the results in enlarged public interest in the work have amply justified these efforts.

As a result of more than five years of intensive educational work on the part of the Marion County Tuberculosis Association, our county now has a thoroughly modern tuberculosis sanatorium with a well equipped outpatient and social service department as well as a fresh air school; ten open air school rooms for anaemic children in the city schools; three tuberculosis clinics; a department of tuberculosis in the city department of health with an annual appropriation of $27,000 available in 1920; six tuberculosis visiting nurses; four new laws pertaining to tuberculosis on our statute books; 35,000 school children enrolled in the Modern Health Crusade, and many other things which I might mention. The most gratifying and far-reaching good, however, has been the awakened interest of all the people in public health and disease prevention.

A TUBERCULOSIS SURVEY

By ARTHUR K. STONE, M.D.

Boston

There are many things that must be taken into consideration by a person preparing to make a tuberculosis survey of a community, but in speaking to this group of nurses I assume that some of you probably have been chosen to make such a survey, and that I am to try to give you the methods, as I have seen them, that may help you in your detail work. Let me say right here, by way of parenthesis, that I thoroughly believe that the person to make a survey should be a nurse with public health experience and training. I am one of those who believe that the background of the nursing profession is practically essential to all forms of social service work, and I am not at all in sympathy with those nurses who have become so-called social workers and thereby feel that they have advanced in the scale of importance, and often conceal the fact that they have had a nurse's training. Nursing experience, as I have said, to my mind is the essential foundation for the best social service work. This does not mean that there may not be certain workers developed who have not had such a training, but I believe that it is the true background for all such work, in the same way that I consider that the background of a four years' medical training is a necessary qualification for men who are doing public health work.

To return to the survey proper. One or more of you have been detailed to make a survey of a city to discover as far as possible the amount of tuberculosis in that community. The first thing is to receive your general instructions from the persons sending you out on this mission. From them you will find out whether it is to be a quiet survey—one where you are to go through the community in a very unobtrusive way, making only such points as you can and getting as much information as possible, without in general permitting the people of the community to know what is being done—or whether it is a general official survey, where everybody is supposed to lend you assistance. For obtaining the best information the latter is the desirable form of survey to make, and yet it should be conducted as far as possible without any attempt at sensationalism. You must have it understood that you are going in with open minds, simply to state the facts as you find them, and to present them to the persons for whom you are working, without any attempt to "get" anybody or to conceal any unpleasant fact you may find.

First of all make friends with all of the physicians in the town or city where you are working. If they combine against you or feel that they are going to be unduly criticized they can make a complete failure of your

work. With their assistance you will gain a large amount of most useful information. The public officials also must be dealt with kindly and they must not be made to feel that they are being investigated. Otherwise you will find that they, too, will put obstacles in your path which will be difficult to overcome. The most satisfactory form of survey is where all the parties are agreed that the work is desirable and yet that it is to be carried on in a quiet, thorough manner. Having made friends with the people with whom you are to work, you must study the city and get all information possible regarding it—the amount of native and foreign population—find out if there is a portion of the town that is called "Little Italy," "Little Hungary," or "Poland," or a Jewish quarter, or whatever it may be. In each of the separate districts, where there are large groups of foreign-born population, you will probably find that there are a few persons who exercise a great deal of authority over their fellow-countrymen, and they must be found out and considered. Sometimes this person may be a grocer, sometimes a lawyer or physician. He may be a banker, or a man who has to do with obtaining work for the men of the community. Find out who these people are and, if possible, win their confidence. An important thing to know is whether there is a frequent change in the population, whether there is a stable or an unstable population, changing with the seasons and with the amount of work in that particular locality. One should become familiar also with the manufacturing plants, of which there will be a few that employ from 100 hands upward, and with the facilities for relief in the city—its hospitals, dispensaries, nursing associations, etc., and what means are taken to get in touch with the parts of the city where the laborers live. Oftentimes all this information can be obtained in a very short time, yet one will sometimes be told that very little is being done in a city. Nevertheless if you look over the ground more carefully you will find that there are a number of small groups of people actively engaged in charitable work, agencies, that are not generally recognized, such as Salvation Army and missions, and these people will be of assistance to you.

Having found out the resources and the conditions under which you are to work, the next thing is to obtain from the local board of health all the information that they have. You will, with the group of people that employ you, decide over how long a period of time it is well to make a study of the conditions. I will assume that a period of about three years will be sufficient to give an index of the existing conditions. Therefore, from the board of health, you will make a card catalog of all the patients that have been reported to them by the physicians as having had tuberculosis during the period of which you are to make a study. From the board of health or the registrar of vital statistics you will obtain the number of deaths from tuberculosis that have been reported, and in addition to that you will have to include a number of possible cases which may be reported under some other heading. Mr. Jacobs in his recent paper asserts that there are over 200 possible designations by which tuberculosis may be reported to a board of health. In all probability you can only investigate a few of the more suggestive ones, such as pul-

monary hemorrhage, chronic bronchitis, congestion of the lungs, and possibly a number of cases of pneumonia occurring in persons from fifteen to thirty years of age. But any such questioning of the death reports should be attempted not by you but by a person with special qualifications and knowledge for this purpose. For the most part you will have to confine yourself to the information that is furnished by the authorities. Having obtained such information from the public authorities and any further information which the board of health may have concerning the people who have been reported to them as having tuberculosis, you may be able to secure in some states a certain amount of information from the bureau of vital statistics of the state, probably under the state department of health. You will next turn to any hospitals or dispensaries for further information. On their lists you may find a number of cases that have come to their clinics where a diagnosis of tuberculosis has been probable but may not have been made, and the patient has never returned for further investigation. At these hospitals you may often find that hip disease and other forms of non-pulmonary tuberculosis are on their books and have not been reported. Insurance agents have the entrée into many homes and can be of much service.

Having made your catalog of all of the cases officially known, the next move is to make a canvass of these cases and an inquiry into the conditions. Where deaths have occurred in permanent homes the process of location will be very easy, but in many instances after the death of a member of the family it is not infrequent that persons move and it may require some trouble to locate the family. Of the living cases a certain number will be found with great ease. The physicians, whose acquaintance you have made during the time you have been making your preliminary studies and amassing your statistical information, will be able to help you, or you can go to them and ask about the cases they have reported. Here you will find doubtless that one or two men will probably be the ones who have reported the greatest number. I know of a city in eastern Massachusetts where one physician tells me that he reports 75 per cent. of the cases of tuberculosis and he knows that that is not the proportion of his practice in the community. Why the other 40 or 50 physicians only report 25 per cent. of the cases is an unknown question. After asking the physicians about the known cases you can then ask about cases that they suspect or have forgotten to report, and if possible, it is well to add these to your list and to obtain permission from the physicians to visit them. The district nursing association in the town and the charitable organizations will be able to supplement the information given by the physicians, and in almost every church you will find some good woman who quietly and unostentatiously is taking care of a number of needy families. I recall an official of a board of health stating that there were only 15 cases of tuberculosis in a certain town and that they were all well cared for under the board of health. When he had made this public statement a man residing in one small village of the town arose and said that his wife was making friendly visits to ten or a dozen families afflicted with tuberculosis, and he did not believe that that small section of the

town in which he lived had by any means two-thirds of the cases that the board of health official had reported, and that if the work which his wife was doing was any indication, there must be a great many more than the 15 official cases known to the authorities.

Thus, making use of every means possible to get the information about the community, you finally reach the families. In the case of those families in which deaths have occurred, the time of the onset of the disease to the time of death, and the relation of the deceased to the family during that time, should be gone into carefully and sympathetically. If your primary idea in making your survey is to convince the community that there is need of hospital provision for those unfortunates, you must find out the amount of distress that has been occasioned to the family by the care of the same; also the amount of exposure that the family has been subject to. Then in the follow-up work it must be ascertained whether other people have been well since the death has occurred, whether they have been properly examined and pronounced all right; and especial attention should be given to the condition of the children, especially if the death has been that of the mother. It is not unusual to find in investigating a known death from tuberculosis that other members of the family have become infected, and even that deaths have occurred which you will undoubtedly find, on consultation with the physician in attendance, were probably due to tuberculous infection. In the case of patients that are still under observation your duty is to find out the condition of the family and its ability to care for the sick one; whether they are able to have sufficient isolation; whether the children are exposed; whether the patient is careful or careless in his habits, and all the points that would have a bearing on the spread of the disease. As the nurse goes about through the community she will take note of overcrowding of the general tenement house population, and discover if laws are being evaded in regard to taking lodgers and giving them over-crowded, unsanitary sleeping quarters. The water supply and toilet facilities must all be considered and recorded, and the amount of general sickness, as well as tuberculosis should be noted.

As you go from house to house seeking people, especially among the foreign populations, you will require a great deal of patience and tact. Foreign names often get twisted and misspelled on official documents, and it is not unknown for persons, for reasons best known to themselves, to change their names. In a survey about which I have had occasion to know, search was made for a man named Anderson. On the card it was recorded that he had at one time been in the State Infirmary at Tewksbury. When Mr. Anderson could not be found, an investigation was made of his record and this stated that sometimes he took the name of Cornelius McManus. Upon searching under this name he was easily found. Your presiding officer, I know, in one instance made 24 different visits before she was able to locate a given man.

People will be suspicious of you, and if you simply content yourself with calling up a tube or asking at the door if a certain person is living there or if anything is known about him, you will always get a negative

answer. It is best to get into the family living at the address where you are making your investigation and sit down and explain why you are hunting up the person, and gradually, when the suspicion has been removed, they will give you the necessary information, whereas up to that time they have had no information that they were willing to give you. Grocery stores and cobbler shops are often places where the movements of families are well known, and if you can interest such persons you will find that they are reservoirs of information. Under no circumstances omit making the acquaintance and gaining the confidence of the political boss of that section. He, it will be found, is often in close touch with the sickness and needs of his community, and it will be surprising to find the amount of valuable knowledge of the community that he has at the tip of his tongue. If only you can gain his confidence and show that you are trying to help him and his constituents you will get much information from him.

Such are the detailed methods of the way in which nurses can conduct an investigation to discover the amount of tuberculosis in a community. After all has been done, it is necessarily a limited report that you can make. Of the cases furnished you to investigate you will probably be able to find out about practically all. For instance in a recent survey involving 1117 cases only six cases were not located. In another instance where over 1543 cases were investigated, in a very difficult community with a shifting population, all but 81 cases were finally located, so that a definite report could be made.

While this method is valuable in that it takes you into the homes and provides opportunity to find out through personal knowledge the conditions regarding the families where there has been tuberculosis, yet if a complete survey is to be made some other method must be employed which will take much more machinery than would be at your command. I refer to such undertaking as the sickness censuses which have been conducted by the Metropolitan Insurance Company, in which, with the aid of their agents and nurses, they have gone into all the homes to which they had an entrée through their insurance work and found out the cases of acute sickness. In the town of Framingham, in the Demonstration which the National Tuberculosis Association is carrying, on a more complete method has been employed. In addition to a sickness census made along the general lines adopted by the Metropolitan Insurance Company, there have been examination drives where as many as possible of the community have been examined by physicians who had had some special training in tuberculosis work. By this means nearly 5000 people were examined at two different periods. The knowledge gained by such an extensive examination, supplemented as it has been by the careful study of the school children and the work in the various factories of the town, has proved of great importance and has led to the discovery of over 200 cases of active and quiescent tuberculosis, starting with a known number of 34 reported cases. The expense of conducting such an examination is probably too great to make it of general practical utility. The plan of forming neighborhood committees and obtaining from such committees

a knowledge of what is going on in the whole community (the plan which is being carried out in Cincinnati) requires a long time and involves great expense in the establishment of the necessary machinery to gain the information.

As an adjunct to a survey made by a nurse who has had general public health training it might often be of great assistance if, in addition to the work that I have described, a consultant physician was sent into the community to help in discovering additional cases. A man should be sent who would be recognized by the physicians of that community as being an authority on tuberculosis matters, and his services could be offered by the people under whose auspices the survey is being made, to consult with the physicians in doubtful cases. If such a consultant is a tactful and likeable man and able to ingratiate himself with the practitioners of the city he will doubtless be able to make a diagnosis and cause to be reported a number of cases that otherwise the physicians in charge had hesitated to so report. Such a consultant service as an adjunct to the work that you were doing would doubtless bring forward a goodly number of cases.

After the statistics have been studied and reduced to tables your work probably will end. The interpretation of this work, except in a very general way, is the duty of those for whom the survey is made. Your work is essentially the gathering of facts in a painstaking, patient, persistent manner. You must not be discouraged by rebuffs and suspicion, but firm in your determination to find every case of which you have record, and willing to work in the face of apparently insuperable difficulties.

PREPARATION OF THE PUBLIC HEALTH NURSE FOR TUBERCULOSIS NURSING

By MARY VAN ZILE, R.N.,
Boston

Tuberculosis nursing must be done by a broadly trained public health nurse.

What is tuberculosis nursing? On the practical side it is the care and disposition of the tuberculous patient and his family. The sick must have the best possible chance of restoration to wage-earning capacity and therefore to happiness. For the patient's peace of mind, and for the economic welfare of the community, the family must have sufficient support and friendly encouragement to maintain the normal standard of living.

The community must be safeguarded by the teaching of precautions to the patient, to the family and to the public. Spread of the disease must be prevented by the enactment and enforcement of laws and ordinances for its control. The public must be educated to support preventive work and to encourage physicians and specialists who are doing tuberculosis and research work. All this must constitute a demonstration to the public so that they will insist upon every possible measure for the complete control of the disease. Supporters of the movement may do this work but invariably it is the nurse who must have the vision which leads them.

What is public health nursing? We know that a nurse for public health work must be qualified by character to give her patients and the general public a conception of higher living. She must have such conviction of the value and need of her work as to give impelling force to her teaching, —in other words, she must know how to "get it over" to them. The nurse must be technically educated, must have the mentality which will fit her for dealing with the daily problems of the disease and of the community welfare. She must have thorough hospital training in the science of prevention. Unprofessional workers fail because of their lack of technical experience. Professional ethics also are extremely necessary in dealing with situations involving jealousy of physicians and the lack of understanding of other social workers.

To do tuberculosis work a nurse must have not a personal but a community viewpoint, and the postgraduate training in public health is a most valuable means to this end, provided, however, it includes training in the specific needs of tuberculosis work. Since nurses are called upon to do specialized tuberculosis nursing, they must have specialized training to prepare them for it.

What is preparedness for this work? We have shown that the nurse

must have a very definite comprehension of the need to be met in tuberculosis nursing. She must possess the background and the training to meet the need, and she must have perception and aptitude in using these means to do tuberculosis nursing. Having carefully considered this subject we shall accomplish little unless we formulate recommendations for the training of the public health nurse to do tuberculosis nursing. We know how little experience physicians and nurses have in the care of tuberculous patients before graduation. It seems to be conceded by hospital authorities that tuberculosis wards or wings could suitably be included in the plan of the general hospital, thereby giving physicians and nurses tuberculosis training. Patients would then go in the earlier stage than to special hospitals, and this would give assurance of better nursing in our sanatoria and in the homes of the people, both for private duty nurses and for public health work. Objections to this system are chiefly the traditional prejudice against the disease which is entirely outlawed by modern methods with other contagious diseases. Another way of giving nurses more training would be by affiliation of general hospitals with tuberculosis sanatoria as part of the training school curriculum. The necessity for such training in tuberculosis nursing in all courses of public health work has also been shown. Let us then consider this resolution:

WHEREAS, The public health nurse is expected to fill the requirements of specialized nursing; and

WHEREAS, A public health nurse is now inadequately prepared for tuberculosis nursing; and

WHEREAS, The safeguarding of the community against this disease is a great responsibility of all present day nurses, therefore,

Resolved, That we recommend to the National League of Nursing Education that they consider including in the training of tuberculosis nurses the following preparation:

The nursing of tuberculous patients in general hospitals;

The affiliation of general hospitals with tuberculosis sanatoria for the training of nurses;

Specific training in tuberculosis nursing in all postgraduate courses for public health nursing;

The continuous education of nurses in the field in progressive methods of tuberculosis work.

Tuberculosis nursing is a necessity in any community. To get it well done we must train the public health nurse for it. Let her have adequate knowledge of the disease and its relation to the community, then give her the vision and the enthusiasm to make her a leader in the effort toward its control.

We must realize that we cannot furnish efficient tuberculosis nursing unless the public health nurse is given adequate specific training in the relating of the disease to the community welfare.

They tell us that in the Great War the price of ignorance was blood—in this tuberculosis nursing the price of ignorance is death. The fruit of adequate preparation is life.

AMERICAN SANATORIUM ASSOCIATION

FOURTEENTH MIDWINTER AND SPRING MEETINGS

FOURTEENTH MIDWINTER MEETING OF THE AMERICAN SANATORIUM ASSOCIATION

The Fourteenth Midwinter Meeting of the American Sanatorium Association was held at the Yale Club, New York City on December 14, 1918. The meeting was called to order by the president, Dr. Vincent Y. Bowditch.

The secretary reported the membership of the Association to be 185. Announcement was made of the deaths of two members of the Association, Dr. James S. Ford and Dr. William H. White. Two resignations were reported.

Col. George E. Bushnell, whose resignation was tendered because of his permanent separation from sanatorium work, was elected to life membership.

Applications for membership from Dr. H. G. Carter, Dr. Ernest B. Emerson, Dr. George P. Heard, Dr. Edwin Paul Kolb, Dr. M. George Milan, Dr. R. J. Wilson, and an application for re-instatement from Dr. Peter De Bloeme, were placed before the Association and the applicants were accepted as members.

The treasurer's report was presented and approved. It was announced that the subject for discussion was the Proposed Classification of Sanatoria—Factors, Standards and Values. Discussion of the subject was invited on the following phases:

1. Location, Plant and Equipment (including laboratories, x-ray and library).
2. Finances.
3. Professional Staff.
4. Non-Professional Staff.
5. Medical Work, Records and Care of Patients.
6. Material and Social Care and Education of Patients.
7. Administration and Accounting.
8. Instruction for Physicians, for Nurses. Research.
9. Dispensary.
10. Results.

At the conclusion of the discussion the president appointed a committee consisting of Dr. Lawrason Brown, Dr. Harry Lee Barnes, Dr. Bayard T. Crane, Lieut.-Col. Estes Nichols, and Dr. E. S. McSweeny, to consider the question of classification and grading of sanatoria, and to confer with the Mississippi Valley Sanatorium Association Committee and to report back at the next meeting.

PROPOSED CLASSIFICATION OF SANATORIA

Dr. H. A. Pattison, New York: For the purpose of starting discussion, and in the hope that discussion will be translated into action, I submit the proposition that the tuberculosis sanatoria of the United States should be classified according to certain minimum standards of efficiency; such standards to be fixed by the method determined upon at a conference of those interested in sanatorium ownership and management, the classification to be made by the National Tuberculosis Association.

The value of classification may not at first be apparent to the directors and superintendents of those institutions which have ample funds with which to keep pace with advancement in methods.

To the managers of sanatoria supported by taxation or appropriation the value will be readily perceived. To be able to go before the city council, county board of supervisors or state legislature and show that because of lack of funds the sanatorium has not been able to meet the highest standards and, therefore, their citizens are being denied first class treatment will give a tremendous leverage.

All sanatoria, private as well as municipal, county and state, are in a sense public service institutions. Prospective patients and their friends have a right to know what kind of service is being given in return for private or public funds expended. The average person has no way of determining the comparative merits of different sanatoria. Inspection and classification by a recognized national body will be a source of help in making a choice.

Classification will serve as a stimulus to better work all along the line in both public and private sanatoria and because of that better work, higher standards will naturally follow. A "class A" institution one year may be reduced to class B in a subsequent year, unless it keeps up with the progress of the times. This has proven true in the standardization of medical schools by the American Medical Association.

In determining the bases of classification there are two important fundamental factors to be considered; first, the welfare of the patients looking toward the arrest of the disease or the comfort of the hopeless cases; second, the protection and education of the public looking to the prevention of infection and the ultimate suppression of the plague.

The right sort of care of the patient and the proper consideration of the public can be provided by the small as well as the large sanatorium. Not infrequently the small sanatorium now provides better care than its larger neighbor.

The publication of the names of such sanatoria as do not reach class A standards should be deferred for perhaps one year giving thereby sufficient time to comply with requirements.

Standards should not be too severe. They should be made no higher than is ordinarily possible for the average sanatorium. The spirit and method governing the investigators should be that of a broad, sympathetic but impartial helpfulness.

It seems to me there should be four sets of standards to cover tuber-

culosis sanatoria as they exist at present. These would be classes A, B, C, D. It is barely possible there should be a class "AA" for the few large, completely equipped plants.

It may be asked, what are the points to be considered in determining classification. Topography, architecture and physical equipment would certainly have a large bearing on the problem—drainage, water supply, sewage disposal, ventilation, porch space, sunlight, etc. One small sanatorium was compelled to close because of inadequate water supply and lack of facilities for the proper disposal of waste. Another ought to close unless it changes the type of its buildings and adds to its equipment.

While location and architecture are important, the work done is vital and the character of work depends upon the personnel. Has the sanatorium a resident medical director or one or more medical attendants who make daily visits? If the attending physician is a general practitioner in the community without special training does he have expert consultation at least once a month? A proportionate number of registered nurses is essential and determined by the number of ambulant and bed cases.

What of diet? If there is no dietitian is the diet supplied well balanced and sufficient? Is there provision for recreation, entertainment and occupational therapy?

The records of the sanatorium are important. Do they conform to requirements in keeping case histories of the social and physical condition and progress of the patients. Has it an adequate approved system of accounts from which can be determined all data necessary for comparison with those of similar sanatoria? Occasionally a superintendent is found who does not know what it is costing to run his place.

Are the laboratory facilities adequate either within the sanatorium or by connection with an approved private or public laboratory? Are sputum, blood and urine examinations regularly made and recorded? Are x-ray plates made of all new patients? (Since research laboratories are not directly concerned with diagnosis and treatment they may be left out of consideration.)

Does the sanatorium have a dispensary service? Is it a center for the education of its patients and public? Has it developed some sort of follow-up work so that its graduates who return to the conditions of life under which they broke down are not permitted to lapse into the old habits of life because of personal carelessness and sanatorium neglect? In short, is the sanatorium performing its proper functions normally and fully?

The sanatorium that did not meet all the requirements of class A, but which is capable of meeting them by the expenditure of a little extra money and effort would be placed in class B.

Class C would designate those that are little better than boarding houses for consumptives, while class D would include those that should either be abandoned or completely reconstructed and rejuvenated.

The method of inaugurating such a project is exceedingly important.

That followed by the American College of Surgeons for developing the standardization of general hospitals seems to me a wise one.

Fellows of the College were asked by the Regents "to elect committees from their own number in their respective states who were most thoughtful on matters of educational standards."

"The purpose of these committees was not only to guide but also to put into action the standardization project. It was the intent of the Regents as soon as these committees were elected to call them together and with them to act." They were called together in October, 1917, at Chicago; about 60 leading hospital superintendents met with the committees.

The problems were discussed from various angles and finally a "General Hospital Committee" composed of 25 members—surgeons, internists, hospital superintendents, laboratory men and other specialists—was appointed to meet in Washington in December.

"The two purposes of the committee were: First, to revise and complete the questionnaire upon which data concerning hospitals are to be collected; second, to review and to complete a minimum standard of efficiency which shall be the basis of hospital standardization."

At its meeting in St. Louis in October the Mississippi Valley Sanatorium Association received and discussed two excellent papers on the subject of standardization and appointed a committee of three to confer with the National Tuberculosis Association upon the subject. The Executive Commitee of the National Association has appointed Dr. Lawrason Brown to direct the National Association's study of the problems involved. For your further discussion I would suggest that the American Sanatorium Association likewise appoint a committee; that the committees of these two organizations come together at the call of Dr. Brown to formulate a plan of procedure. Such a plan might involve a conference or convention of properly accredited delegates from the sanatoria of the country, thus securing wide-spread interest and discussion. It would tend to smooth the path for definite constructive action, in my opinion, if all sanatoria are given an opportunity to participate in formulating standards.

Dr. Harry Lee Barnes, Wallum Lake, R. I.: I feel that the classification and standardization of sanatoria will be a great step forward. The question is, will it help us? I think it will. Most sanatoria administrators often feel the impossibility of getting a complete equipment. In many institutions conducted by states and municipalities one perhaps cannot get a sleeping porch or a children's ward, or perhaps he cannot get an x-ray equipment. I know in my state I waited patiently ten years for it. If we could find someone to classify us in class C or D it might give us a big boost with our legislators. Then again, it would help the most conscientious medical man in reminding him of things which he overlooks because no one, however able, can think of everything. It would stimulate physicians and boards of managers to attain a higher standard. The end results of better equipment and better management will be better care of our patients, which should be our true aim.

In considering just how the thing should be done it seems to me there are two fundamental things which are different from each other involved in this classification. It would rather seem to me unwise to try to combine finances, administration and accounting with the medical work in ranking sanatoria. Our first duty is to care for the patients well. Our second duty is to do it in the most economical way.

Now I can conceive of a sanatorium which carried on its medical work in an ideal way, but was extravagant; and I can also conceive of a sanatorium which was conducted in accordance with the highest standards of business method and with great economy, in which the medical work was bad. So I should be in favor of classifying, first, as to medical care, and second, as to business method or economy. Then, you might rank some A as to medical care and C as to business method.

In ranking as to medical care Dr. Pattison did not say just what these terms "A, B, C and D" would mean in per cent. The schools used to call A over 90, B 80 to 90, C 66 to 80, and D 50 to 66. This definition of the classes or grades is the first step. The next step is to rate all the constituent elements of the medical work to make 100 per cent.

In grading sanatoria I would credit open air life and good food with 15 points each and the regulation of rest and exercise with 25. General sanitation, including care of sputum, general cleanliness of the buildings, clothing and the patients themselves, 10; discipline of patients and employees, 10; and the remaining 25 points to be divided equally between the following eight, giving three each: histories, physical examinations, laboratory work, medical records, x-ray, nursing, advice as to how long to take treatment, and artificial pneumothorax. The regulation of rest and exercise is by far the most important thing the sanatorium can do to produce cure, and full credit should not be given unless there is a satisfactory system of controlling the work and other exercise which is actually in force. Tuberculin treatment does not deserve credit. Instruction for physicians and nurses while a credit to the sanatorium as an aid to the general movement, is not necessary if the physicians and nurses have had proper experience and training elsewhere. The sanatorium should have a library of several hundred books including literature on tuberculosis, and a good magazine like the JOURNAL OF THE OUTDOOR LIFE available for patients. While dispensaries are often very useful in connection with sanatoria, many excellent sanatoria may be so situated that there is no opportunity for a dispensary, so that dispensaries should not be a factor in grading sanatoria.

In regard to the second way of grading sanatoria as to economy of operation, it would appear that there should be a system of investigating the financial status of all free patients so that the institution may avoid pauperizing people well able to pay on one hand, and of causing hardship by overcharges on the other. There should be a system for collection of charges due from patients.

The biggest responsibility pertaining to economy of operation is a proper system of making purchases after carefully scanning the quotations from different sources and with a good judgment in controlling the

salary budget and systematizing the work of all employees. The prevention of waste whether of provisions, heat, light, or table waste is very important. A good system of accounting is important and even essential but will not of itself produce economy of operation. I hope the committee which attempts to set the standard for administration and accounting will give some credit to making annual financial reports which can be a help to other sanatoria. Many sanatoria print expensive reports but do not tell you what the cost of raw food is, how many employees they average during the year, what work these employees are doing, and how many in each department, or what salaries they are paid. Many institutions with a farm, piggery and hennery do not show gain or loss in these departments. If all these facts were available in published reports, it would be a great help to economical operation as valuable comparisons in the different departments could be made. It would help us get increases in salaries for our employees if we underpay, or to reduce salaries if we overpay.

One point relating to accounting which is badly in need of standardization in sanatoria is the method of computing per capita cost which is done a little differently in nearly all sanatoria. Many of them do not take an account of stock at the beginning and end of the year; others do not report a deficit but avoid it by carrying the bills from year to year; others report a deficit but do not compute it in the per capita cost. Many do not deduct receipts from sales to persons outside the institution, and this should be done if the true cost of sanatorium treatment is to be obtained.

Another important point is that sanatoria have no standard way of computing hospital days. In Rhode Island we do not count a hospital day unless the patient is actually in the institution and receives care on that day, but in the majority of sanatoria these are counted when patients are home several days or even a week at a time, or even when the patient is actually under care in another hospital temporarily, and some sanatoria are even counting hospital days before the patient comes to the institution if he comes after the date requested.

Dr. L. Rosenberg: I find that the title of the paper under discussion does not embrace hospitals for advanced cases. Now, as the paper very aptly says the majority of the sanatoria in this country are well managed. But we all know of the existence of hospitals where the advanced cases are treated in a very imperfect manner. As a very general rule the average municipality considers the hospital for advanced cases as a place where patients are permitted to die and they do not get very much treatment with the hope of improvement.

There is a tuberculosis hospital in one of our richest counties that is a disgrace, and while there is under way a project for a modern hospital, that place has been away below standard, and yet it is the only place the indigent poor of the county can be committed to. If the public is to benefit by this classification more than the sanatoria (which it ought to) it seems to me that the hospitals for advanced cases require the first searching inquiry. It is true, as the writer states, it will be very much

easier for us to get the appropriations and have improvements made if we can point to other institutions where men manage better and standards are better than our own. But the crux of the problem is the care of the patient. Everyone of us who has grown gray in the profession knows that once in a while a hopelessly ill tuberculous patient makes a very decided improvement and goes back to work again, and we cannot know if we have 50 advanced cases in a resort if it may not be possible to have one life prolonged or saved.

Dr. G. W. Beach: Dr. Barnes has pointed out one stumbling-block that will be encountered in any serious attempt to grade institutions, viz., the lack of uniformity of methods in accounting. In two or three institutions with which I have been acquainted, the bookkeeping methods have been prescribed by legislature, as well as the manner of making up the daily census. Hospital days included patients who were absent temporarily at Christmas or any other time. States, and no doubt some counties, are extremely jealous of their prerogatives in prescribing methods of accounting. They will leave a superintendent fairly free in the medical work, but when it comes to keeping accounts, purchasing, tabulating, etc., they say it must be done in a certain manner and in no other. It would seem that considerable difficulty will be met when we attempt to carry out uniform methods of accounting.

Dr. H. B. Campbell: Relative to the subject of which Dr. Barnes has spoken, I know that at the Norwich Sanatorium we are in the habit of including in patient days those days on which the patients are away on leave, and I see no objection to that. If one goes to a hotel and takes a room by the week and then happens to be away for a day or two, the hotel management does not make any allowance for the days away. It seems to me one would have to itemize the care, the amount of food, etc., which you gave to the patient, and deduct that during his absence.

Dr. Chadwick: The patients stay on our books until discharged. If one is away on a visit he is considered as though he was in the sanatorium. We are obliged to do that according to the requirements of the state auditor. The patient is charged for board and the auditor requires us to carry that account on the ledger from day of admission until he is discharged. The only way we could modify that method would be to discharge the patient every time he went home for 24 hours and then he would have to go on the waiting list and be readmitted which, of course, would not be feasible. Our state regulations would conflict with Dr. Barnes' method of charging up as hospital days only time actually spent in the institution. Furthermore, I think it is a justifiable thing to do. Our overhead expenses go on just the same. When the patient is away a few days during the period of treatment we have to keep his bed and our food expense is about the same. It would make no appreciable difference in food expense if the population does vary a little either way.

The President: No, it could not be figured.

Dr. Chadwick: You would have to get more than that. The same amount of food is requisitioned of the storeroom, whether there were a few more there or four or five less.

Dr. Emerson: When the subject of standardization first came to my attention, I was not particularly interested in it. It seems to me, however, that the scheme as outlined in the program would tend toward a higher plane of work.

The subject of accounting is one of the most important items of institution or sanatorium business, and it is only by a proper system of accounting that you are able to know at any time the financial standing of your institution.

Massachusetts has recently adopted the budget system of making appropriations. It has been customary in the past when going before legislative committees for our appropriations to base the estimates on the amount expended the previous year, disregarding the fundamental basis upon which such estimates are made, that is to say, the quantity of any article consumed or used during the year. This year our estimates are based primarily on the amount consumed, and not altogether on the amount expended. In other words, if we have consumed one hundred barrels of flour, that is taken as the basis of the estimate and the amount necessary to purchase it is derived from the best information we are able to get from the various market reports. As a further illustration, we will say that we have used ten thousand pounds of meat and that ten thousand pounds will probably be used during the ensuing year; the price will be derived in the same way that we estimated the price of flour. This method of making estimates is predicated on a ration basis of feeding.

I believe that an accurate accounting of the distribution of your food and general supplies is just as important as an accurate ledger account, in fact without it you have no possible way of stopping the leaks or of determining the most economical varieties of food. The lowest priced food is not always the cheapest. By maintaining an accurate system of store accounting you are enabled to decide whether a 750 pound animal is more economical than a 500 pound animal. The same holds true with the different items of food down through the list, and of your general supplies. Your accounting should be carried one step further by keeping an accurate record of the edible waste from your kitchen, wards, and dining rooms. This, I believe, is one of the best checks you have in controlling your food distribution to the various wards and dining rooms.

Different states and counties have their own ideas as to how the accounting should be carried out. I do not think there is very much danger of going too far in the matter of cost accounting, provided the system established is simple and workable. It is of no value, however, unless it is followed up with the same degree of accuracy and persistency that is employed in the financial accounting. I believe that every sanatorium should have some form of judgment as to whether this or that cut of meat is the most economical, or whether in someone's judgment there is a reasonable quantity of edible waste going to the piggery. Keep accurate records of materials received and issued and you eliminate this guess work.

Dr. E. S. McSweeny: In entering the discussion at this point, allow me to make some remarks on the general subject of grading or classifica-

tion and the program as sent you. It is one of the duties of the secretary to compose these programs after the subject has been chosen and the matter discussed in the executive committee. In making that up for to-day, it seemed necessary in order to give the discussion some form, that some topics or headings should be put down. In doing this, however, I had no intention of trying to limit the scope of anyone's remarks.

The meaning I had in mind for the second topic has not really been touched upon, and shows how difficult it is to express one's thought. In admitting sanatoria to classification or grading at all, certain requirements in plant, equipment, and personnel, below which the institutions cannot fall and still be considered proper places to conduct the treatment of tuberculosis cases, must be required. Likewise, the amount of money available to run the institution must be sufficient to permit of a reasonable expectation of the maintenance of decent conditions, or else that place is not properly financed and not worthy of being included in any grade, either A, B, or C. This is what I had in mind by topic number *2*, Finances,—rather the amount of money available than the way it was spent or accounted for. I know sanatoria which have not money enough, and never will have under present conditions, to conduct their business properly. One of two things ought to happen; they ought to be properly financed, either from public or private funds, or they ought to close up.

As to the general subject of grading of these institutions, I think it is a wise thing to do for two reasons. One class, those which Dr. Barnes gave; the other, because it is going to be done anyhow, and if we do not do it for ourselves, someone else will do it for us.

In connection with the subject, I do not like the word "standardization." It is a question of grading or classification, not standardizing. Standardization methods of accounts, or something of that sort may follow grading, but standardization of sanatoria in the sense that one is attempting to bring all up or down to one level, is not at all what anyone has in mind, and no impression to that effect should be permitted to get abroad. It is not a question of bringing to a likeness the differences that exist, but of classifying them. There are bound to be many things which are proper for the larger, and improper for the smaller sanatoria. There are bound to be many things which are necessary or suitable or desirable in certain types of institutions which do not concern the others. It is, to take a bird's eye view of the whole subject and try to say in what grade a sanatorium of a certain class belongs, not to compare it with other kinds of sanatoria and attempt to make or break its reputation thereby. One of the difficulties which lie in our field, which Dr. Barnes did not speak of, I encountered in travelling about the state as an expert for the Health Department. One of my duties was to make surveys of county sanatoria. I recall very well an institution which I think is, without question, absolutely lacking in its plant, in its professional equipment, in its methods of conducting its business, in its care of its patients, and in practically every other respect that one can enumerate. It is absolutely lacking as a place kept as and still considered by anyone to be a tuberculosis sanatorium, and yet if you take the number of cases in that

institution which are every one advanced cases, which remain there for months, and finally die there, and figure that against the population of that county and the known cases of tuberculosis in that county, that sanatorium is discharging a duty to the community which very few other sanatoria in the state are doing. It is housing and segregating a larger portion of the cases in the county, and taking care of them until they die, whereas some of the other sanatoria which are well-built and are excellent institutions in their medical conduct, in the care of the patients, and in their professional and other standards, are really doing such a small part of the work which by law they are charged with, that is the care of the tuberculosis problem in their counties, that one would have to rate them as very much inferior to the other of which I spoke.

If anything we do comes to the point where sanatoria are actually going to be suppressed, it behooves us to move very cautiously. All of these things have got to be kept in mind before we reach a conclusion. Simply because there are a considerable number of beautiful sanatoria located on commanding hills with pleasing architecture and well-fed patients, etc., let us remember that that is not the only, and perhaps not the ideal type of institution, and not think that everyone must conform to it or go out of business. On the other hand, let us ever keep in mind that the whole scheme should be planned to bring about the improvement of all institutions. By no means let us kill any unless there is no question that they ought to be killed.

Dr. Rosenberg: It seems to me that a place doing such work is an almshouse not a sanatorium. Anybody can house patients, and do them some good. That is not what we are after; that is just the kind of hospital that Dr. McSweeny mentions standing most in need of improvement. It may be interesting to know that New York City subsidizes its hospitals to the extent of at least 80 or 90 cents a day. They do not care about a hospital day; they do not care whether we have the overhead or not; they say the patient is not there, is not being doctored, consequently they are not going to pay for it.

The President: The discussion has been confined largely to sanatoria in the East. Dr. Pattison has some points he can tell us of methods in the West.

Dr. Pattison: Most of the methods in the West, I think, are not vastly different than in the East. But I would be glad to call to your attention one institution I happened to be interested in up to the time I came East —The Rockford Municipal Sanatorium. During that period when I was one of the trustees we introduced and passed a resolution in the Board of Trustees authorizing a public accountant to devise and install in this little 35 or 40 bed institution a system of accounts that would be suitable for any tuberculosis sanatorium or hospital—that could be expanded for the large one or contracted for the little one. The accountant was a man whom I had known for 25 years, had gone to school with, and I sat down with him and talked the matter over with him and got his interest and asked him to put in some special study on it. I said to him: "I am going to ask you to put in a little more time and study on this than the fee

you are going to receive from the sanatorium would ordinarily call for." And he did that and has devised a system for that sanitorium based somewhat on the system of accounts used by the hospitals in New York City. This will be found in "Hospital Accounting and Statistics" by William V. S. Thorne.

That system has been in use at Rockford for perhaps two years, and I am told that now, this coming year, when they work out the budget for the City Council, they will be able to determine just how valuable it is going to be. So far as I know it is the only system that has been installed with standardization for the whole country in mind and sent to the National Tuberculosis Association for their inspection and criticism.

The points brought up by Dr. Barnes are exceedingly interesting and certainly will open up a great deal of speculation and argument, and I think they are well taken. But perhaps it may be necessary to separate the two. In a way they are inseparable and yet in another way they are separable.

In the matter of the "hospital days," there are two or three things that came up there that were rather new to me, that I had not thought about; and I am afraid I would be a poor juryman, for, as one man talks about it, I can see that surely he must be right, but when the other man here who does count the days when the patients are absent as hospital days talks he seems to be right also. They may both be right, but we must get on common ground for purposes of comparison. It is comparative statistics we want. If you consult the annual reports of the sanatoria which we have on file in the Association office, you will find that the daily per capita cost of various sanatoria throughout the country will be from 80 cents to $2.40. That does not mean that somebody is keeping patients for 80 or 100 cents a day. It means that something is left out of account. If, on the other hand, it is costing 240 cents a day per patient, it is an extravagance that should be investigated even in war time. Perhaps it is not too high at the present time, but it certainly was much too high two or three years ago when it was recorded.

This question of the states and counties having set rules for accounting is an important one, and yet I do not believe that the difficulties are insuperable. The tendency is towards standardization in municipal accounting now throughout the country, and there is an organization working on that very problem. If you can show a board of trustees or a city council or legislature that it is indispensable that the sanatorium shall have a uniform system of accounts, it really can be brought about in a great many instances; not always. And because it cannot be brought about always, it is perhaps a reason for splitting up the medical and the administrative departments. So if I understand Dr. Barnes aright, he would have the classification something like A and B, A for the medical and B for business administration, or it would be B, A; B for medical care and A for business management? Was that your idea?

Dr. Barnes: Yes, in a general way. I would like to speak of one or two things again. It is possible to get around state and county laws which compel financial reports to be made in a certain way. Treasurers'

reports can keep the letter of the law, but superintendents in their general reports can point out errors and make corrections which will show what the financial reports failed to show. For instance, we used to have special appropriations by the General Assembly for repairs and improvements and the auditor naturally required that these appropriations be kept separate from the maintenance appropriation, but any man who has given accounting any attention at all knows that repairs and replacements should be included under maintenance, while improvements should not. In my reports I added on to the treasurer's report what was spent for repairs from the special appropriation before computing my per capita cost. You cannot depend on auditors and expert accountants to make such corrections because they are enmeshed in laws and precedents and follow the beaten trail. It takes a mighty effort to make figures tell the the whole truth but we superintendents could do it if we could adopt a uniform standard.

In regard to hospital days: I contend that the hospital day is a day on which you actually cared for the patient. It is a question of fact, did you do it or did you not. If you did not do it you are not entitled to credit for it. It is true that the overhead goes on while the patient is on a visit, but that is not relevant. Suppose I have 350 beds and my number drops to 300, my overhead for the 350 goes on, therefore I will say I have 350 whether I have or not, because my overhead continues. Isn't that a little absurd? Suppose that the patient is charged for a few days before he arrives at a sanatorium because he does not come as soon as the date set. If you charge him board for a week, and then find he is dead, how about these hospital days? It is proper to charge a patient for an absent day as a matter of discipline for leaving his bed empty when others are waiting for it, and also to prevent loss of income for the institution, but it is not right to count this as a hospital day in computing cost of care and treatment.

The President: We have not heard from any of the gentlemen who represent the semi-private sanatoria; we shall be glad to hear somebody on the subject.

Dr. Fred H. Heise: I am not prepared with anything to say at the present time, and I think the things Dr. Brown will have to say later will cover almost anything I would have to say. But I think it is a very desirable thing to classify the medical and the business administrations separately. It strikes me more and more, as I visit the different sanatoria, that the two cannot be combined. If they are combined, the result usually is a pretty well financed institution which is bound to sacrifice a degree of its perfection according to medical standards. And if you are going to try to have the highest medical standards, some of the other features will have to be sacrificed and the institution will not qualify for class A. For instance, if all the modern methods of diagnosis are to be included in class A, I am quite sure that most of the sanatoria, as they are at present, are not going to qualify for this rating. And therefore I do not think the medical and financial ratings should be combined. I think they should be considered separately. The subject is very broad, so

entirely broad that, after Dr. Brown has given his conclusions of the various arguments, it would be my pleasure to introduce a motion to leave this classification to a committee to be studied out. It needs study and consideration from a thousand and one different angles.

Dr. Bayard T. Crane: I am not at all prepared to speak from the point of view of finances, the subject under immediate discussion, but from the broader point of view of whether or not the standardization of sanatoria is desirable, I should vote "yes," generally speaking. I would like to relate some of the problems in the town of Rutland, probably from an angle quite different from that seen by most of those who are here.

The town of Rutland, Massachusetts, exclusive of the state sanatorium, has gradually developed a certain number of small so-called private sanatoria. Those who are managing these sanatoria have been encouraged to do so more or less by public necessity. The management of these places naturally is voluntary—and this brings into the management of these sanatoria various grades of intelligence and carefulness in adhering to medical rules.

Now the question of regulation of these places has long troubled the town of Rutland. I presume this same question must exist perhaps at Saranac Lake; perhaps in Asheville; possibly in Colorado Springs,—in any place where voluntary small sanatoria are apt to develop. The question is, how to control these places; how to eliminate the places that are undesirable, and how to encourage those that are desirable. The town board of health for some fifteen or eighteen years has tried to fall back on some existing law in the state of Massachusetts by which undesirable places could be eliminated and closed up, and the attorneys general of various generations have been trying to find out what could be done. Their answers have always been that no existing law would help to control the places. We tried in the board of health a few years ago to adopt some sort of a classifying standard, and suggested something of that sort to the attorney general of the state to see if the local board of health could adopt a standard of that sort, and by means of that standard eliminate certain of these institutions. The attorney general of the state stated that it could not be done.

The next practical step that we have finally come to was to get a bill through the legislature, which states that no place can open without the consent of the local board of health. In other words, each private sanatorium and boarding house operates only under a license. That perhaps is slightly off our topic and yet in a way it shows the necessity of a standard of some sort. I can readily see that some of these private institutions that I am speaking about would lift their standards up from a sense of pride if they were graded in class C or D, and yet I am perfectly sure that some of them won't and the only thing that will bring certain of them to terms is the fact that a health officer insists, "This is on the law books of the state of Massachusetts, and no matter what you think about the excellence of your institution, we think it is not so, and you have to adhere to the laws of the state."

The next point I would like to make is this: Presumably the majority

of those here are interested in the larger public sanatoria, and I want to make a plea for the semi-private and private institutions caring for patients, and for their recognition in any classification that is made. I can very easily see how it is easy to make a standard which is satisfactory to the executive officer of a large state institution that might fail to be of any service whatsoever in the care of private patients.

The last point: It seems to me, generally speaking, that it is a very desirable thing to adopt some sort of standardization or classification.

Dr. Griffin: I feel, Mr. President, that I have little to add. Awhile ago somebody said here that patients could be well taken care of in a barn. If they can be, and if those who have them in charge are giving them everything that is essential for their care, it seems a bit unfair to make them close their institution by classifying them so low that the work cannot be carried out without criticism. After all, the result attained should be the criterion, whether the institution be large or small, public or private, and it is perfectly true that better treatment is afforded patients in some small places that could be classed only as B, C or D, —than in some others which, by the equipment, might be in class A. It would seem wrong to me, therefore, to legislate such places out of existence without giving them a trial to determine what results might be obtained. On the other hand, it might be a stimulus to small institutions to strive for a continually higher rating if various grades were established, and certainly this could only work for good.

The President: There are two gentlemen with us as guests, Messrs. Sprenger and Burt of the New York State Department of Health, who have something to tell us on the standards of construction. We will be very glad to hear from these gentlemen.

Mr. Sprenger: In my work in connection with the State Department of Health, and in Mr. Burt's also, we pass on questions of sites, plans, buildings, and general equipment of tuberculosis hospitals. I was at Otisville six years, and Mr. Burt was there with me from time to time, being associated with Dr. McSweeny. One of the difficulties we find among many others is the changing events and the changing ideas of just what is actually needed. In almost every case there seems to be more or less difficulty in getting ideal sites and locations because of the varying interests involved among the different people who are interested; they want a location here or a location there, so that in many instances we do not get everything that we would like, and we simply do the very best we can under the circumstances. Then, when we get to a point where an architect is employed to make plans, we find that in most cases the architect selected has never planned a sanatorium, and does not know what the needs of a sanatorium really are. In some cases he will be interested enough to go and see some that have been constructed, and try to learn something about them. In other cases, they do not seem to take the trouble to go even into an adjoining county to see what has been done. We try to help them in every way we can, and advise with them, and, as I said before, simply do just the very best we can.

Now, we find a great many questions that we have to deal with on

which we would of course welcome more light, and it has always seemed to me, if such a thing were possible, that it would be well if we could find the exact number of cases that there are in every locality, not only the advanced cases but the incipient cases which need treatment; and also whether there is any great variation in different localities, in order that we might get as much light as we possibly can so as to recommend and advise the character of construction which would be best adapted to the individual localities.

In going over statistics, I cannot recall the figures, but we have had some tabulations made with reference to the questions arising in the construction of a sanatorium as to just what provision should be made for advanced cases and just what provision should be made for incipient cases, and I presume you are probably all agreed that the character of the construction should be entirely different for the different kinds of cases.

In connection with the grading and standardization, which, it seems to me, might have a good many advantages, it seems to me well to take into consideration all the varying conditions that one is apt to find and has to meet. Now, of course, as Dr. McSweeny said before, in a good many of the small institutions appropriations cannot be easily obtained and probably cannot be obtained at all for certain kinds of equipment, which in some cases might be considered necessary and in other cases might not,—because I presume in the small institutions they would not require, for instance, the elaborate laboratory equipment that they need in the larger institutions. In some cases counties expend funds for a laboratory equipment aside from the tuberculosis institutions, which laboratories are available for the tuberculosis institutional work. But one great point that I would like to lead up to without taking up too much of your valuable time—and I might say we have been trying to work along that line—is the need of having a number of standard plans which could be used in almost any locality, and which would embody all the really essential and the very best requirements in the construction and arrangement of a sanatorium. I presume in the grading and standardization, probably one of the first things to come up would be the site, its equipment and the general arrangement of the buildings. Mr. Burt, who is here, has been working for some time on plan standardization, and has already drawn up a number of sample plans which we have submitted to various communities, and I know that we would be very glad to have any of you gentlemen look them over and very glad to get any criticisms or suggestions. Mr. Burt can tell you something more about the details.

Mr. Burt: I came here to listen, not to talk; but I appreciate the courtesy of the invitation to say a word. My work has been as an architect in a way, in the Department of Health in New York State, and as Mr. Sprenger has explained, I have made up a number of what we call typical drawings for sanatoria of different sizes, accentuating the sanatoria of small sizes because throughout our state the new county law requires counties of 35,000 or more population to erect a sanatorium where they are not already provided with them. Such sanatoria in most cases will neces-

sarily be small, and so our drawings for the most part have been for small buildings. In several cases the drawings which we have prepared have been practically followed in this state for county sanatoria.

I fancy that all of us who have had anything to do with this have noted perhaps the reluctance on the part of physicians and architects to come together. There may be a good reason on the part of physicians for their not wanting to consult architects, but if I had a quarrel with physicians it would be that you too often have not conferred with architects by going into the plans of sanatoria with them. As an architect I readily admit that most of us know little about the technical details of hospital construction, but we will do anything in coöperation, that we can, and are willing to learn.

My first experience in sanatorium work was at the Municipal Sanatorium at Otisville, where I remained for four years as architect and constructing superintendent, and, as you all know, we tried to do there almost everything that has been tried. It was a school, an experiment station, and we hope in these typical drawings which we are making for the state (or for anyone else who wants them) to embrace the best that has been known up to date. I am sure that to solve the problem as it ought to be solved, we must all work together on it without any conceit on the architect's part, and with great liberality on the physician's part. We recognize that it will take the brains of both professions to produce a complete and satisfactory work. I think I have nothing more to say at this time.

The President: May I ask if it will be possible to bring those plans over here for us to look at them?

Mr. Burt: Yes, I think I have four or five of different sizes. I could bring copies of those which would be better viewed from the table than the wall.

The President: Could they be passed around?

Mr. Burt: Yes. The State Department will shortly be publishing a book and they will be available for distribution.

The President: At this afternoon's session, will they be available?

Mr. Burt: Yes, I could bring them here.

Dr. Little: I came in late for the paper and do not know what has been covered. From the discussion I take finances to be considered an item of importance. If we have the authority to classify sanatoria, there are many things to take into consideration. From a financial standpoint we should consider the kind of patients treated. In some of the sanatoria the majority of patients are bed patients, in others the majority are ambulant and able to do work. Politics must be considered. Many of the sanatoria have the most capable staffs, while in others the staff is appointed by politicians, and the patients do not receive the treatment they should. The number of physicians per patients is important. I know of one sanatorium where one physician has to take care of from 150 to 200 patients, and it is considered an ideal county sanatorium.

The President: Any further remarks before we proceed to the next subject? If not, we will proceed to the discussion of the professional

staff and non-professional staff, taking these together. Are there any remarks anyone wishes to make upon those?

Dr. Lawrason Brown: May I write something on the board for the professional staff? That will give us something to talk about. (Dr. Brown wrote the following on the blackboard):

PROFESSIONAL STAFF

	A1	*A*	*B*	*C*
Resident physician	x		x	
Assistant physician	x			
Assistant physician	x			
Research worker	x			
X-ray expert	x			
Head nurse	x	x	x	x
Assistant nurse	x		?	
Statistician	x			
Dentist	x			
Druggist	x			
Dietitian	x			
Vocational instructor	x			
Medical stenographer				
Attending physician	?			
Consulting physician	?			x

In discussing this matter lately at Saranac in anticipation of to-day, we decided that every institution had to have a head nurse and an attending physician in order to be classified in group A. It was a question of how many others shown on my list they had to have, depending largely upon the number of patients. You could have them all, for instance, in an A institution with a certain number of beds. If you increase the number of beds and do not increase your staff, you would necessarily have to fall back on B and would not get another rating A. So it brings up the point as to whether you should have one physician, for instance for every 30 beds, or two physicians for 60, and over 60 beds you know you should have three physicians. Nurses we did not classify. I thought that I would put this on the board so that it would give you something to start from.

Dr. Heise: May I have an explanation of the classification? What of a physician who devotes only a small part of his time to the duties of the sanatorium, and does not reside at the sanatorium. I have considered a resident physician as one who lives at the sanatorium, but does not necessarily give his full duties to the sanatorium. In other words, he may have some private work. I think the point is well taken. And I think we all ought to agree that there must be at least some attending physician and a nurse present in every sanatorium. I think the question of the number of patients allowed for each physician is rather a debatable one. My observations in the case of sanatoria in general indicate that there is usually one physician for, I should say roughly, 75 or 100 patients.

Dr. Brayton: I should like to discuss the subject in its entirety, but I will just mention a few important points. It seems to me that no matter how small the institution, there ought to be a resident physician. You will get better results with a resident man than you will with just an at-

tending man—a physician who only comes to the institution daily or so many times during the week and devotes only a small amount of time to the work. Of course the head nurse is absolutely essential, and the number of employees and the staff would be graded according to the number of patients taken care of. I think the idea of classifying sanatoria is an excellent one. It will bring the institution to what it should be, up to the right standard. The thing that appeals to the public is the cost of maintaining the institution, and I do not believe that you can compare the small institution with a large institution that is not properly balanced as to its overhead expenses or the number of patients that can be taken care of. The thing we wish to do is to run the institution right, particularly for the benefit of the patient. I think we have got to treat everyone connected with the institution alike, from the superintendent right down, and if the superintendent wishes to keep informed as to what sort of diet his patient is getting, he should live on the very same diet he is giving to the patient or employee. That does not always hold true. I think the classification of sanatoria will not only benefit the institution, but will help the tuberculosis work in general. One thing that I think we all ought to consider in this work, whether we are a private or public institution, is the matter of donations. We ought to encourage donations from the public and not let it be thought that every bit of money we get must come from the public bodies like the legislature.

Dr. Campbell: I do not think it is quite sufficient to put down the list of the staff of the sanatoria. It seems to me the personal element should enter into it. Just how much each individual puts into his or her work, entirely upon that will depend the results that you get. It seems to me impractical to treat patients as some must be treated in larger institutions. I think you have to get under their skin. You must know your patients in order to help them along. At times a staff of 15 will attain greater results in an institution than a staff of 20, providing it is working along the right line.

Concerning the matter of rating sanatoria, of which Dr. Pattison has spoken, that is, that they be rated A, B and C, it seems to me it might work an injustice on some institutions,—my own for example,—where if certain equipment were desired to give the institution a higher rating, the request being denied by the legislature, the matter would have to remain in status quo for a period of three years, since the legislature meets not annually but biennially. Consequently the institution would rate C for three years rather than one.

Dr. B. S. Pollak: The necessity for standardization or gradation of institutions, is apparent to all, but, as Dr. Little has brought out, in the consideration of the tuberculosis problem as a whole, as the National Association views it, it seems to me that the great bulk of the institutions to-day are handling the advanced or moderately advanced case and, therefore, they are not sanatoria, but rather hospitals.

Necessarily, in the adjusting of hospitals, due allowance should be made, especially when comparisons are drawn between hospitals and sanatoria.

Before coming to the point, I want to emphasize the consideration of the tuberculosis problem *per se.*

If we are to have institutions graded A, B, and C, we should consider not only the ethics of the institution, but rather whether the institution itself answers the needs of the community. For instance, if an institution were standardized under class C, the people among whom such an institution is located might not be willing to send their sick or afflicted to an institution thus standardized, even though they were far advanced cases.

Again, the cost of maintenance of an institution which has been so often referred to, depends entirely upon whether we have sanatoria patients or hospital patients.

The nursing problem of the institution, depends largely upon what sort of institution we are dealing with; hospital cases require a different type of nurse than do the sanatoria patients. In hospitals, the remuneration for nurses is much greater than that usually paid in sanatoria, thus we are obliged to pay nurses $75 per month, whereas in most tuberculosis institutions nurses are paid from $40 to $50 per month. So, in standardization, all such details will have to be considered.

Again, is it necessary to have graduate or head nurses? Our experience has been that graduate nurses are better adapted, however, many of the gentlemen here connected with state sanatoria are availing themselves of the services of graduates from some of the training schools, such, for instance, as Dr. Cullen's of the Maryland State Tuberculosis Sanatorium.

Finally, there are so many small institutions springing into existence yearly, that they will have to be carefully borne in mind before a general scheme of standardization is adopted.

Dr. Brown: We feel all of that, Dr. Pollak—those of us who have tried to go into this. This list I have made, of course, is just following out Dr. McSweeny's suggestions to the effect that when you classify an institution you have to classify it from every point of view and then, as Dr. Barnes has stated, grade them to see how many A's, B's, and C's they have. I do not believe it would be right to publish this right away. We make these suggestions to you so as to make possible classification of an institution. The whole thing should be done from the standpoint of aiding everybody concerned. This is one thing we are going into, as I take it, to help ourselves. Some of us need help.

To differentiate A from A1, or something like that, we have got to consider everything. My idea is to get all views on these points. You can question a lot of this; vocational instructor may be unnecessary. Any stenographer can do medical work, but if you can get a stenographer who knows the terms and can take and write off your histories, it is a great help. We put these down as really something to work for, so if anybody wants them or needs them in an institution, they can say that the National Association, if they do adopt any such thing, says it is all right.

Dr. J. B. Dinnan: I am quite interested in Dr. Brown's list of staff. Isn't the real point of it all, is the work done and well done? If so, they

get grade A. If it is mediumly well done, it gets B, C, and so on. What difference does it make whether the x-ray man is a doctor or not? If the medical work is well done; if the history is well taken; the examinations well made and all the work is well done, what difference does it make where the doctor sleeps? In regard to the nursing, possibly you could grade it. Grade the nursing done, and so try to specify whether you call for heads and assistants and so on. The possibility of whether you could get a good dietitian is not the point after all, but whether the diet is well looked after. Suppose she is or is not a graduate dietitian, is the work well done? What you want is not to try to write down so many people on the staff and call them certain names.

Then the question of dentist which I think is very important. Does Dr. Brown consider a man who devotes his entire time necessary, or simply an attending dentist who comes once in a while?

With regard to the druggist: there again, if the drugs were well dispensed, what difference does it make unless it conflicts with the state law whether he is a registered druggist or whether a doctor? It seems to me the point is: Is it the work that ought to be graded or nomenclature of the persons who do the work.

Dr. Brown: It seems an almost impossible task at first to classify and grade the sanatoria, but it is a problem we have to try to solve if possible. We will leave the x-ray work until later. But it was put down here to enable some man who wants to get an x-ray technician to say "the doctors have no time to do it."

Dr. Barnes: In a rough sketch which I made up I would only rate x-ray for about three in 100, which I think will do. Any institution might do excellent x-ray work and might be short of everything else. I think you have got to take all that constitutes the medical work and go to the institution and rate that institution for all of these things together, and use them all together to make your percentages.

In operating a dispensary where diagnosis is all important an x-ray might count as 25 or 30 on a scale of 100, but in sanatoria where so large a proportion have tubercle bacilli in the sputum or the diagnosis is otherwise clear, an x-ray cannot be so high. It ought to be rated less than 10 in sanatoria whose main object is treatment, and if, say 90 gives you A, a sanatorium excellent in other ways, but without an x-ray, might deserve A.

Dr. Heise: May I ask Dr. Barnes a question? Do you think you can practice tuberculosis without an x-ray?

Dr. Barnes: I think not, therefore if a sanatorium is without an x-ray, it should not have 100. I would give it 90 perhaps, if everything else were well done.

Dr. Heise: How many per cent. for x-ray?

Dr. Barnes: That is a question of individual judgment. Say three; perhaps five; or ten. Certainly, in order to get perfection or 100, he should have the x-ray. But grade A in schools does not ordinarily demand 100 per cent., so I think he might get 90 without it.

Dr. Meyer: I am awfully sorry I could not get in earlier and hear the

discussion. What I have got to say will be in regard to salaries for men who are devoting their lives to service in sanatoria, making tuberculosis a life work. It seems to me that the standardization of salaries of house officials is an important subject for study in the National Association, as I suggested some years ago. It seems to me it would be a handsome thing for some kind of provision to be made whereby they would get adequate returns for the work. They are at least human beings who are expected to do good work and they are entitled to more than a living wage. I have suggested, heretofore, that some such standardization of salaries should be established and wrote to Dr. Landis in regard thereto, when he was chairman of a committee of the National Association some years ago, but I have never heard from him, I am sorry to say. But I think the matter is important enough to look upon the physician as a human being and a man, and that the standardization of work at the sanatoria, according to the kind of work, should be considered and perhaps studied and finally solved as we are trying to solve this. In addition to that, in connection with the use of the x-ray, I agree that we might be able to get along fairly well without it. However, we might as well say that we can get along with the four-in-hand to-day as they did a great many years ago, but it would not be a proper method of traveling.

About the school work: It seems to me that every sanatorium that has the facilities ought to make it a point to have a young man on the house staff who should be under your paid man or your volunteer radiographist. There are lives at stake. If they offer to pay your respect a better salary elsewhere you must attend to the vacancy promptly. Your senior officer or your first or second or your third assistants could promptly step in and take the pictures, take them well, develop them properly, and interpret them. That seems to me to be the ideal thought that we ought to include in classification A.

I think we ought to consider also the individual peculiarities of the resident officers. I have often pointed to the wonderful work that Patterson did at Frimley, England. He was a remarkable example of personal sacrifice in studying the individualism of his cases in the sanatorium.

When you are classifying the sanatoria, I think that some marking or some grading should be given to the energy, to the interest, to the personal sacrifice and to the individualism of your chief physician in that institution. If he is a man who simply wanders along, a small simple type, doing no better work, it seems to me that it is not the ideal thing and we ought to give him a demerit and take him away from class A if he were classified there.

Dr. Brown: I will write another suggestion for rating on the blackboard:

Laboratory Work	*A1*	*A*	*B*	*C*
Sputum	x	x	x	x
Urine	x	x	x	x
Blood	x	x	x	
Bacteriology	x	x	x	
Serology	x	x		
Research	x			
Sputum every month				
Urine every three months				

This is the laboratory work classification or grading of sanatoria according to the laboratory work that they do: sputum, urine, blood, bacteriology, serology and research. You will notice under C that every institution is expected to do or have done sputum or urine. Under B they also do blood and bacteriological work. That would mean a simple blood culture and counting the blood cells, and in A we see that serology ought to be done, and also the Wassermann test ought to be taken; and in A1, here would tbe research work. Sputum ought to be examined every month and urine once every three months. Those ought to be the minimum.

I would like just to call attention if I may to the fact that when we classify this or that sanatorium as A, B, or C under this heading it is not put in grade A, B, or C, but it simply puts the sanatorium in that grade for this one subject, and that you have to consider all subjects together before you can say in what grade it belongs. If you will bear that in mind in the discussion it is going to make it very much easier and simpler for us to get along. It is difficult to keep things in mind because, as Dr. Barnes has suggested: take A, there would be 90 per cent.; B 80 per cent.; and C 66 per cent.; and D would be under that. Under this laboratory scheme which is for your criticism and suggestion C is the minimum that any sanatorium ought to perform.

Dr. Pollak: Mr. Chairman, I would simply like to mention the fact that in order that the institution may remain from the laboratory standpoint in class A, the prerequisite should be a good financial subvention, because otherwise I am sure very few men will be able to keep the type of men that will be able to do serological or research work.

Dr. Brown: That is something to work up to, Dr. Pollak.

Dr. Dorn: How would an institution be classified if there was a county laboratory to do the laboratory work?

Dr. Brown: Of course, an institution that has a number of beds would probably do its own laboratory work, but with a small number of beds you could hardly expect them to do expensive laboratory work, but if the work is done, then I think they ought to be classified and given the credit for the work done.

Dr. Meyer: I would support the plan for the serological examination of the blood, in view of the fact that most men are working in institutions and in sanatoria where large numbers of patients are entered, among whom there are always a certain number without bacteriological proof of tuberculosis. Some of those cases are unquestionably cases of chronic syphilitic lung trouble and, in order to reach a conclusion which cannot be reached by physical signs or by the history, you must have a serological examination. And, as Dr. Brown has very properly, I think, said, so long as blood is taken for the one test, sufficient may be taken for both, because I believe it is conceded that the complement fixation for tuberculosis is at least of service when it is positive. And, of course, taking the blood, I say you can make both tests, the tuberculosis and the Wassermann.

About the urine: extremely important because I believe the case of tuberculosis complicated with diabetes is, in most cases, unsuited for

sanatorium care. The prognosis in many of those cases is made serious by diabetes.

Dr. Rosenberg: May I ask Dr. Brown in connection with the word sputum: wouldn't it be advisable to include in the work the inoculation of pigs?

Dr. Brown: I would say in answer to that, that we might have "laboratory animals" as one of the headings under the scheme, but we thought it was wiser possibly to take it for granted. Anyone knows what we mean by sputum examination. That was a simple, careful routine examination for tubercle bacilli once a month; that is under C. The most important examination in the sanatoria is for tubercle bacilli. It is the one thing that you can swear to, if positive, that the patient has tuberculosis.

I had in mind for the tests for urine, taking the specific gravity, making a note of the clearness and doing a few simple tests for albumen and sugar.

In bacteriology we do not mean simply a study of the sputum for the other bacteria, because I have felt for some time if you find tubercle bacilli in the sputum it is not very often you get very much further if you study it for all sorts of bacteria. I had hoped we were going to prove something above secondary infection. I had the other in mind though, in some of the cases where we could not get any tubercle bacilli in the sputum. I also had in mind endocarditis, where the diagnosis had been erroneously made for tuberculosis, and you could not study bacilli in that.

You should make the two tests in sputum and urine as simple as possible for grade C. When you get in A1 a sanatorium will be equipped to do any sort of work whatsoever, anything and everything. It can go to the last refinements of all laboratory work. Our experience has been that so far few of our cases show anything in the urine. We did them every month and did them for years that way, and we got so little out of these examinations for the institution, which has only one man to do all the work for 20 or 30 patients, that we stopped it. We want to give him a chance.

Dr. Barnes: I think it might be well to get an expression of opinion under serology as to whether complement fixation should be done for syphilis. I know we did it for a year or two and we got about 8 per cent. positive, and it was a question of judgment whether it was worth while to do complement fixation for syphilis on all patients as routine, in order to weed out those syphilitics and treat them. Should we or should we not? Are we doing our full duty to our patients if we do not go over all of them to detect syphilis by the Wassermann?

Dr. Brown: How many cases have you discharged a year, Dr. Barnes?

Dr. Barnes: We discharge about 400 or 500.

Dr. Brown: Four hundred would be about 32 cases?

Dr. Barnes: Yes, that is about what it means. Perhaps we would diagnose syphilis in 15 or 20 if we had not made the Wassermann tests. Now shall we do it to the 500 for the 10 or 15 cases which we might otherwise have overlooked? It might be well to get an expression of opinion on that.

Dr. Meyer: May I say just one thing here. I should think that you should, from the point of view that the sanatoria are the proving grounds, not only for taking curative measures. In recent times new methods

have been introduced for the differentiation of obscure cases, and it seems to me the thing to do in every question is to investigate thoroughly, as for example, how many cases having tuberculosis only will give a positive Wassermann. The best place in the world where that question can be decided will be in these institutions where cases of tuberculosis are together and where the Wassermann can be done on them. For the benefit of the world, we have to conduct a great many tests from which we get no immediate benefit.

Dr. Heise: It happened just once under my supervision. As you all may know, we make the complement fixation test as a routine procedure on admission. For some reason the Wassermann test was not made in this case. He refused to give a positive history of syphilis. We treated him in the ordinary way for four months, while we made repeated examinations of the sputum, and during these four months his progress was very unsatisfactory. Then we made another complement fixation test for the Wassermann reaction, which was positive, and at the same time accused him of having syphilis; accused him of it and treated him for it, and he subsequently recovered. It was just by chance that we did not perform the Wassermann test when he was admitted, and when his progress was unsatisfactory we *did* hypnotize ourselves into the belief that his tuberculosis was progressive, whereas, as a matter of fact, it was the syphilis that was giving him his symptoms.

Dr. Chadwick: It seems to me that such frequent sputum examinations would make a great deal of unnecessary work in an institution that had a large number of progressive cases. To do that every month in such cases just to be able to comply with the regulation, would be without value to anyone.

Dr. Washburn: During my last year and a half at the Rutland State Sanatorium, we adopted the policy of making Wassermanns on all patients. During this time approximately 800 Wassermanns were made. Our positive cases were between three and one half and four per cent. of the total number examined, which is considerably lower than Dr. Barnes found at the Rhode Island Sanatorium at Wallum Lake. We had the benefit of the State Wassermann Laboratory. I would like to ask Dr. Emerson if he has continued this practice of requiring Wassermanns as a routine procedure for every patient.

Dr. Brown: Let me jot down another scheme under the head of medical work as follows:

Medical Work	*A1*	*A*	*B*	*C*
History	x	x	x	x
Physical examination	x	x		
Chest examination	x	x	x	x
Routine laboratory work	x	x	x	x
Routine x-ray	x (stero)	x	x (stero)	
Routine dentist	x	x		
Special diagnosis	x	x		
Tuberculin	x	x		
Serologia	x	x		
Bacteriology	x	x		
Special tests	x	x		
Research	x			

We do feel that it is wise to hold up before everybody the advantage of having research work done wherever it is possible, because even the man who does good work and demands good work gets along better if he tries to do something more than in a routine way. In C we have chest examination, and examination of sputum and urine. In B we have history, chest examination and laboratory work, and flat x-ray plates. That ought to go in B. In A, notes are made under all the heads that I have indicated.

Dr. Rosenberg: Would you say that a man that takes flat plates is not doing as good work as the one taking stereoscope plates?

Dr. Brown: Yes, they will reveal things that flat plates do not show.

Dr. Dinnan: We often take plates to show how often they vary. I have one or two private patients that became interested in it, and have them taken once a month and put it up to me to interpret them. You get a haze as it comes and a haze as it goes. The great advantage of the x-ray, I may say here, is that it details the pathological changes that take place in the living patient. This is wonderful and it increases your interest.

Dr. Little: I should like to ask the doctor in this routine work if he intends to give any credit for doing post-mortems; is not that one of the good things?

Dr. Brown: I think it is perfectly splendid, Dr. Little, if you can get them, but I do know how these sanatoria do, and we have a strong feeling that we should send patients home to die. Perhaps you are doing work under different conditions. I do not know how many sanatoria are able to get post-mortems. Do you get many chances, Dr. Bowditch?

The President: No.

Dr. Brown: The patients usually go home, and I think it is a good plan. But in classifying sanatoria to-day, post-mortems in a place where you have people die, are important. We let them go home alive if we can.

Dr. Pollak: The 1918 law in New Jersey gives us the right to do post-mortem in every case.

Dr. Brown: (writes the following chart on the blackboard):

RECORDS

History	*A Full details*	*B Full form*	*C Brief form*
Physical examination	x		
Chest examination	x	x	x
Chest graphic	x	x	x
Laboratory records	x	x	
X-ray records	x		
Special records	x		
Running history record	x	x	
Weight chart	x		
Temperature chart	x	x	
Diagnosis chart	x		

Note history in grade C. Many have a brief printed form. Under chest examination note chest graphic. Under B a full printed form for

making the physical and chest examination, which is a graphic running history sheet. In A you have the history in full detail and the other data.

Dr. McSweeny: Just by way of starting the discussion, I want to register disagreement with Dr. Brown on the way the minimum record ought to be kept to justify classification of the sanatorium even in C. It seems to me a sanatorium record which does not tell the ultimate outcome of the case, which is not provided for in any way except the running history, is not entitled to any classification until you get down to the last three letters in the alphabet. In going over sanatorium records, it was one of the most difficult things with which I came in contact. Many of them had very elaborate stories of the patient previous to admission, something of what they found when the patient got there, even notes as to more or less minor things as to lung condition, but what his condition was on his discharge, what the general situation of the patient was when he died or got well, or was in prospect of doing, one thing or the other, was an absolute blank, and there was no way to determine it except by inquiry of those who had handled the case. It seems to me a minimum standard for a hospital record ought to be the condition on admission and the condition on discharge. I think that is a good deal more important than the running record: how you received your case, and what he shows when he leaves.

Dr. Dunham: Wouldn't it be proper under class A to leave a space in addition for subsequent history? Isn't that quite an important thing in a sanatorium,—subsequent history?

Dr. Brown: After he leaves? Yes, I think it is very good.

Dr. Campbell: I would like to ask if there are any provisions made for the recording of the patient's bacteriological conditions?

Dr. Brown: That would come under special records (writes following on blackboard):

CARE OF PATIENTS

Medical treatment	*A1 A Excellent*	*B Fair*	*C Indifferent*
Instruction of patient	x		
Nursing	x		
Special treatment of patients	x		
Artificial pneumothorax	x	x	
Light	x		
X-ray	x		
Tuberculin	x		
Vocational	x		
Infirmary	x	x	
Work	x	x	x

I simply put down "work" because a great many institutions are using their patients to do more and more of their work, and I thought it a wise thing to take into consideration under the care of patients.

Dr. Barnes: I wonder whether under nursing there ought to be some expression of opinion as to what percentage of trained nurses a sanatorium should have in order to conform to a standard. I know it has been the feeling in some institutions that all the head nurses, on wards for instance, ought to be graduate nurses, and I think that trained nurses rarely stay

in sanatorium work long enough to learn it thoroughly, and that "experienced" nurses are often better.

Dr. Rosenberg: I might say in reply to Dr. Barnes that several years ago the matter of what kind of nurses were best for sanatoria was discussed in this society, and the late Dr. King gave the opinion that a graduate nurse was not a prerequisite for a sanatorium but very often was a nuisance. Most of the graduate nurses, he said, seek employment in the sanatorium because they themselves are tuberculous, and this does not make them any the fitter. I think Dr. King's objection was that the graduate nurse would be apt to patronize the undergraduate nurse.

Dr. Brown: The main thing as I understand it about a graduate nurse is that she is able to meet emergencies that an undergraduate nurse does not know how to meet in a large number of diseases, and if you can get a nurse and train her in tuberculosis, the complications are not so many that she cannot meet them intelligently.

I think it is very wise to take into account just how much nursing the patients get, the details as to how to record or value it are difficult to work out. One of the most valuable things in this discussion is to show how much detail there is and also to consider how difficult a subject it is going to be.

Dr. Halpern: On the point of work, this has been our sore point in the treatment. We have been increasing the resistance power that the patient has but we have avoided producing auto-inoculation, because there is enough auto-inoculation produced in the tubercular patient as it is. We should rather avoid auto-inoculation, as our aim in treatment is to keep the disease quiescent at all times.

Work should be chiefly considered as a means of hardening the patient and increasing his power of resistance, and also as a means of keeping up his spirits and morale. The problem before us is to find the right kind of outdoor work for patients at all seasons in our cold climate, I mean Liberty and Saranac Lake. Most sanatoria offer only indoor work in the kitchen or dining room, which is, as a rule, distasteful to and not proper for the patient.

Should it be possible to designate some suitable out-of-door work with the above object in view, and to standardize it among the sanatoria it would be a great step forward in the treatment of tuberculous patients.

If Dr. Brown has had some experience in this line, I should like to hear of it.

Dr. Brown: I might say that at Trudeau, of course, we have had a workshop for—I forget how many—years. The great thing about the workshop has been that patients no longer suffer from enui the way they used to. They are able to work and get their minds off the fact that there is very little to do. We tried a little of Paterson's work and gave it up, but we have felt that whenever possible we would give a patient some work, as much like his old work as possible. If he was a stenographer we gave some stenographic work to do; if he was a bookkeeper we employed him in getting up statistical work. We tried to fit the work to the patient so that the patient could go back to his former job ultimately, and

we feel by doing that we get far better results. Unless a patient is able to do very much more work at the institution, it is doubtful if he will be able to do his usual work when he gets back. We have a workshop but we limit the amount of work the patient can do there. We allow them to work out of time and they do all sorts of things they want. We have all sorts of work. We teach them telegraphy, how to bind books, even moulding.

Dr. Barnes: Before we leave the subject of work I would like to call the members' attention to a condition which in inspecting sanatoria I have found quite frequently. You ask what system they have for planning the exercise and work of the patients, and they will often show you a good theoretical system; how once a week they go over the patient's temperature, sputum, weight, etc., and then prescribe so much exercise and so much work. But rarely have I seen a system in force to make sure that those prescriptions are actually carried out.

When we started sanatorium work I found that we prescribed an hour's work, and the patient maybe walked three hours; and we might prescribe half an hour's walk, and he might walk half a day and have a hemorrhage; and so we started a system by which the patient had to give a walking ticket signed by the doctor to a doorkeeper in order to go out. When he returns he must show his ticket to the doorkeeper and if he has overstayed his time he is caught. Now it seems to me that a sanatorium in order to get full credit for regulating work and exercise should show that they not only have a method of prescribing work and exercise, but also have a method for seeing that these prescriptions are carried out.

The President: I would like to hear from Dr. Crane with reference to the private sanatorium associations.

Dr. Crane: I appreciate the opportunity to speak upon the subject. It seems to me it is very large and I am very apt to get away from the topic under discussion. But it has seemed to me for some time that we could accomplish a great deal by making a greater feature of a systematic planning out of work by patients during their treatment. With that idea in mind, we have established in Rutland an agricultural and handcraft colony. In general, our scheme has been aimed for the purpose of reëducating any individual into a new line of occupation when possible, but at the same time making this work remunerative even during the active stage of tuberculosis.

Now it seemed to me that the latter end of the customary sanatorium treatment period might well be spent in an environment other than the sanatorium, so the plan at Rutland is to transfer the patient when he is convalescent, as we say for the sake of a better term, from the sanatorium to the workshop where he or she has the advantage of whatever work is established there, where he or she also is given certain money remuneration for the work done. This subject of occupation has received, I believe, scant attention. We do not call it auto-inoculation; we simply try to substitute remunerative work for aimless exercise. Instead of making him walk the roads as a form of exercise, why not put him down to clerical work or agricultural work or carpentry work under right conditions? And

as to the results, it is pleasing to say that at present we have some active cases of tuberculosis to whom we are paying $30 per week. One of those men was earning it within two weeks of the time he was having hemorrhages. He was a publicity man. We wanted certain publicity done and we gave him this task to do, which he was able to do with his pencil and pad, a great deal of it as he lay on his back recovering from hemorrhages. It was all under control. If anyone is skeptical about the practicability of this I think all he needs to do is to come and see results; see what the patient says about it. I am as firm a believer in rest as anyone here, but it is just a question of hitching up the man or woman to his own sphere of usefulness in order to relieve cost of maintenance both to him or to the public or what not.

We shall call this place where they have this work, for the want of a better term, a graduate sanatorium. No work is done without the prescription of a physician. The time comes when it is very often hard to keep a patient contented in a sanatorium—then the work colony offers great advantages. And when a man steps from the workshop into his own occupation he does so without very much uncertainty. If the occupational idea is carried out to its logical conclusion, it leads up to the next step in the control of tuberculosis, and that is the establishment of large industrial and agricultural colonies for convalescents and chronic fibroid cases where a number of occupations would be established; where also it would be possible to bring not only the patient himself but the patient's family. Thus would be established a real tuberculosis town, complete educationally, hygienically, industrially, socially, economically. This is more than a health resort. It is desirable to establish enough individual trades so that you can always have something from each applicant, utilizing the creative ability in our patients instead of making them dead drags (parasites is the worst word). I know by practical test that many cases requiring sanatorium treatment are able to be self-supporting. I thank you very much.

Dr. Pattison: I feel that you should take into consideration the work being done by the Federal Board for Vocational Education. Their purpose is making a study of the problem of the returned tuberculous soldier. The National Association has appointed an advisory committee of eleven members, with Mr. Fred M. Stein as chairman of this committee, and with Dr. Bowditch, Colonel Bushnell, Dr. J. A. Miller, Dr. D. R. Lyman, Douglas MacMurtrie, of the Red Cross Institute for Cripples, Dr. George M. Price, the health editor of the *Survey*, and some others to direct this study. As you know, the Federal Board is charged by Congress with the duty of training men for trades, giving them vocational education and placement when they are discharged from the Army hospitals. The problem is a tremendous one just at the present time. There are about 2400 cases under the Bureau of War Risk Insurance. There are that many men that require tuberculosis treatment and possibly some of them are in training. That is, of the cases now under the Bureau of War Risk Insurance, 40 per cent. are tuberculous. It is a two to five problem; that is, two out of five of all the War Risk cases are tuberculous. The Federal

Board realizes and frankly confesses they do not know what to do with the tuberculosis problem and has asked the National Association for some help. How much we are going to be able to give them remains to be seen. When we had our first meeting on the 4th, there was a general discussion of the problems. The Federal Board has gone a certain way studying conditions regarding tuberculosis. First of all they do not offer any training to an active case of tuberculosis, but will use every effort through tuberculosis agencies, Red Cross agencies, and all other possible agencies to get that man to take sanatorium treatment; and those cases now in the sanatoria will be offered some forms of occupational instruction and prevocational training. Mr. Kidner, the secretary of the Invalid Soldier Commission of Canada, who has been placed on the Federal Board as special advisor, went to Fort Stanton, New Mexico, where there are 80 of these cases and made a survey and came back recommending that a vocational director be sent down there and such assistants as he might need to offer some training for those men. We found that 20 gave their occupations as farm hands. They were not farmers having their own land to till but had been merely hired hands. Those men will need some help to some other occupation.

The next position that the board has taken is that every man, tuberculous and other disabled men—every man who is fit to go back into his old occupation will be encouraged to do so and not encouraged to adopt some new trade. If he is not adapted for the particular work he was doing in that trade, he will be trained to some other part of that same trade or industry, so that the previous knowledge the man had will be utilized.

They have also taken the position at present that their district vocational advisers may send men to specialists for a special examination—particularly tuberculosis cases, not depending upon the examination of district medical officers who will be general practitioners and usually not skilled in the diagnosis of tuberculosis.

The question of placement is going to be a serious one for the Federal Board. In the first place they must find an occupation for the tuberculous that is suitable. The men have been urged to seek outdoor work and they therefore feel they must have outdoor work, and as you know the outdoor jobs are very scarce. Then they are confronted by the fact that there is wide variation of opinions regarding what are suitable occupations for the tuberculous. Various lists have been given of jobs as suitable or unsuitable for a tuberculous man, and if we should put a list of some of those occupations on the blackboard and give you a slip of paper with each of those occupations named and ask you to put down "yes" or "no" as to whether it was or was not suitable, the probabilities are that there would be a wide variation in opinion among us here to-day.

They do not know what to do about it. We hope to offer them some standards by which they may judge the particular job. It is not enough to say that the printing industry is one of those trades which is unsuited for the tuberculous. There are plenty of jobs in the printing industry which a man may safely do, such as simply running the monotype keyboard. He can do no harm in a room by himself, and with all the win-

dows open, if he likes, he can run the monotype keyboard. It is not sufficient to say that horticulture is all right for a case of arrested tuberculosis. You may have two greenhouses side by side, as was brought up in committee meeting the other day. They may be exactly alike and will both be used for growing rose bushes; one will be suitable for the tuberculous and the other won't. In one the rose bushes are raised for shipment to distant points. The greenhouse in winter is kept below 60°, and in summer time all the men work out-of-doors. In the other house there is an intensive growth for the sake of getting roses for the market; the atmosphere is moist and superheated and it would not be suitable for the tuberculous.

We are going to try to find some way whereby the medical officer can sit down with the man and reason with him as to the work he wants to do. He may say "I want to be a police officer." That has been given as a suitable occupation. You can point out the duties of a policeman. He must walk his beat, and he must perhaps take care of the traffic regulations; stand in the middle of the street and direct passing automobiles, which is something of a nervous strain. He may have to run up four flights of stairs after a burglar with fear that he may be shot, and he is then under severe physical and emotional strain. "That is not the kind of a policeman I want to be," the man will say.

"I am offered a job in a bank and I am really an employee in the bank, but will be given some police powers. I go to work at half past eight in the morning and get through at four thirty." That is quite a different proposition and you could not give some men a better occupation. I think we can find some standards by which to judge the occupation as to whether it is suitable or unsuitable.

These are some problems which are presenting themselves to this committee. A sub-committee has also been appointed to gather data relating to the industrial colony for the tuberculous. This is hardly germane to the subject of discussion here, but Dr. Brown mentioned work, and it gave me the opportunity to tell you something of our investigations for the Federal Board.

Col. Estes Nichols: The work in the Army in regard to therapeutic exercise is working very satisfactorily, I think. My ideas have changed a great deal in regard to the work since I have seen it in force. You can apply exercise, or "occupational therapy," varying with the man who is sick in bed to the man who is about able to resume civil life. It helps very materially with the man who is sick in bed, not only in his mental condition, but also in his physical condition. I was somewhat antagonistic to it at first, but I have been convinced against my will that it is of much value to give the work or exercise to the patient who is confined to his bed, and when he gets up to a certain point in improvement, he is transferred out of that part of the hospital for bed patients into a "reconstruction detachment," where he is given exercise in the curative work shop. In this curative workshop he is prescribed certain types of work to suit his physical condition,—work like typewriting, telegraphy, practical carpentry, practical painting and many other things. It has been per-

fectly amazing to me to see the effect of this sort of work upon the patient and the most important effect, I believe, is that it makes the man feel that he is still a man, that he is not hopelessly ill, and that he is being treated more like a well man than a sick man.

Dr. Brown asked you this morning if in the school of telegraphy you had ever seen anyone who was able to do anything with telegraphy. We have trained a great many men who can manage a "slow" wire. A slow wire means 18 or 20 words a minute and they have done this in a comparatively short time. These men before they entered the school had never heard of the Morse or International Codes, but you can go into the school of telegraphy and see men in one corner of the room receiving and another man in another part of the schoolroom sending messages. I have investigated to see whether they were sending actual messages that were not known to the other men and when I see them actually capable of both sending and receiving, I know that this work is something that is real and seems to me worth while.

Now, what is the next step after the "curative workshop"? It is the vocational training that Dr. Pattison has just spoken of. Of course, the whole purpose of the treatment is to build up their immunity, to harden them physically, to rehabilitate them mentally so that they can go out with a feeling that they are going to be able to earn a living. If they are not able to earn their living at their old occupation, they should be turned over to the Federal Board for Vocational Education so that they may be taught some new occupation by which they can earn a living in an easier manner than they did before. Supposing a patient was working in a power plant, perhaps as an oiler or repairer—the Vocational Board can teach him to be a supervisor so that the work is easier and his physical condition will continue to remain in good shape, whereas if he was obliged to return to his old occupation, he would probably break down. This is the work that we are trying to do in the Army and I believe that it can be applied to civil sanatoria to a certain extent and, I believe, to a great extent.

I hope that many of the members who are here to-day will come to see the work in these hospitals. Now, the most important part of this work in civil sanatoria is to get instructors, that is, somebody that is competent to plan out a system and then to see that somebody is trained to carry it out. Our instructors are men who in civil life hold important positions. They were inducted for this particular work and if you had to hire this class of instructors in civil sanatoria it would make it, of course, very expensive, but I believe that it would be well worth while and that steps will be taken to apply this work more generally in civil sanatoria.

This reconstruction work must be started with the patient in bed, perhaps with an hour's work, and you will be amazed to see the men after this work is started. You would never recognize the ward as the same ward, but the most important feature is to make the work productive as well as reconstructive. I have been very much interested in this matter and have investigated work done in some of the insane hospitals and hospitals for feeble-minded. The insane will not do piffling work for any

length of time. It must be productive to keep them interested. I mean by productive work, work that can be turned into money. The feeble-minded is the only class of patients that can be taught to do unproductive work, thus showing that either sane or insane patients have active minds that must be intelligently engaged. I am not going to take the time to describe the kinds of work that can be done at the bedside, but if you could go into one of these wards before the work was put in force and then go in afterwards, you would be simply amazed at the difference in the appearance of the patients. Of course, we all realize that rest is one of the most important features of treatment, but we have somewhat neglected the mental part of the patient in our treatment, and it is necessary not only to rehabilitate the man physically, but he must be rehabilitated mentally before he is turned back into civil life.

Dr. Brown: I wish Col. Nichols would describe the work the men do.

Col. Nichols: They can sell hundreds of dozens of these mats—more than they can possibly make. I have been trying to get some for my own tables, which I was unable to do until I went to a patient's bed the other day, who is hopelessly ill. This man knits and makes table mats and, as I expressed admiration for his work, the next day a mat was brought to my office by a reconstruction aide, who said, "He thought you would like this mat. Perhaps you will like it." I said, "What is it priced?" and she remarked, "He was going to give it to you," but I paid the regular price of a dollar for the mat. Then she stated, "We want to let it remain in the Christmas sales because we will not get enough materials ahead to make a good showing for the Christmas sales." This is because the visitors come and they buy everything we have for sale. You would be amazed to see the toys that are made and hand mops such as we wash dishes with, and brushes and small hand bedroom work, the knitting of sweaters and making of hammocks. All these things can be done at the bedside. I do not think that lace work and bead work are practical for men patients because they will feel that it is not productive. I think all the toys in this country can be made in the sanatoria if we set out to do it. If you could see these toys I am sure you would feel that we can beat any other country in toy-making, and men can get money for this sort of work. It is productive work.

I have always contended that it is unwise for a man with active tuberculosis to be put at any sort of work, that is, that patients who are in bed must be relaxed and if any work is given them, it would certainly raise their temperatures. When we started occupational bedside therapy, we were not sure what the result was going to be, but I think now that we are sure. It will not be possible to apply the work to every patient, but it is with the majority of patients, and 67 per cent. of all patients are taking some sort of reconstruction work.

Dr. Chadwick: I would like to ask Col. Nichols what he does with regard to the disinfection of the toys before they are sold and go to the general people.

Col. Nichols: The woolen and knitted materials and all sorts of fabrics are simply disinfected with formaldehyde gas but the toys are not. Toys

cannot easily become infected because they are all painted. I should feel there would be little danger from that standpoint.

Dr. Emerson: The subject of work is one in which I am intensely interested, and after listening to the remarks here this afternoon it would seem as if it were possibly a new departure in the treatment of tuberculosis. The employment of patients, however, at Rutland dates back some 20 years, to the time when Dr. Bowditch was in charge of a service as consulting physician. Rutland was originally a semi-private institution, and every patient was obliged to pay. There were a certain number of patients who were unable to pay, and they were given an opportunity to work for their board. It was found that they could do this without injury. When the other three state sanatoria were opened the law was changed so that it became illegal to allow a patient to work for any compensation or for his board, his expenses being met another way. Discontinuing the custom of allowing a patient to work for his board resulted in many instances in changing his status from that of a patient to that of an employee.

The sanatorium itself offers abundant opportunity for the occupation of patients about the buildings and grounds, work which will take up their time and be of financial benefit to the institution. I think every patient if able should be required to contribute in this way towards his maintenance. From this group of working patients permanent employees may be selected.

At one time I considered the employment of ex-patients to be a very unbusinesslike proposition. I have, however, modified my views quite a bit in regard to this matter. I believe that the practice of employing ex-patients is not only a good thing for the patient but that it is good business for the sanatorium, provided such employees are properly selected. It enables the consumptive patient to become self-supporting, and enables the institution to secure an employee of somewhat better moral fibre than we are able to secure through the employment agencies. About 65 per cent. of the employees at Rutland are ex-patients, filling positions of varied responsibility, from bookkeeper to chambermaid. One difficulty we have is that as soon as a patient feels himself able to do a few hours' work, he thinks he should be put on the pay-roll or else leaves the institution for more wages than we cay pay.

I am glad to hear what Col. Nichols has said in regard to teaching men to do bead work and kindergarten work. The teaching of bead work or arts and crafts serves a useful purpose in so far as it takes up a patient's time or amuses him, but the majority of patients, particularly the men, want something more practical. It is manifestly impossible to teach civilians new trades during the short time they spend in the sanatoria, the majority must of necessity go back to their former occupations.

There is, however, one very practical subject which we may teach our patients and ex-patients, particularly the women. For some years we have maintained a training school for nurses, thus affording many ex-patients an opportunity to fit themselves for self-support outside of our institution. They are trained particularly in the care of tuberculous

patients, and we have had no difficulty in placing our graduates in similar lines of work in other institutions. These girls are selected after a period of observation as patients, and given two years' training. It seems to me that this is a very practical thing to teach our patients, particularly the women. There is always a demand for nurses trained in this work. Many patients become interested in assisting with the nursing; it does them no harm and gives them some practical knowledge for use after discharge, provided they are not later enrolled in the training school.

Col. Nichols: We must get our tasks within the scope of the patient and appeal to the pride of the patient before we reach the stage where we can brag and risk publicity in talking of the relation to an infection and that sort of thing, and overcome it. In carpentry we have had men apply for the work before they were physically able to take it up. They are all anxious to take up curative work or exercise and get away from the occupational bedside work as they realize it is a step nearer discharge.

The President: In order to get through the subjects classified before us, we will have to proceed. We have already touched upon the question of administration and accounting. I think we will go to No. 8, Instruction for Physicians and for Nurses.

Dr. Brown: (draws chart on blackboard):

INSTRUCTION FOR PHYSICIANS AND NURSES

	A1	*A*	*B*	*C*
Staff meeting / Seminar	x	x		o
Nurses training	x	x	x	
Training school	x	(good)	(good)	
Internes, instruction	x	x	x	
Special students	x	x		
Special tuberculosis course:				
(a) Physicians	x			
(b) Nurses	x			
Nurses, instruction		x	o	o
Diagnosis clinic	x			

Under "instruction" I have put down staff meeting, nurses training, training school, teaching or instruction of internes, opportunities for special students to study at the institution, special tuberculosis courses for physicians, for nurses, and instruction for nurses who are working in the institution, graduate nurses who do not know tuberculosis, and the diagnosis clinic, more or less synonymous with the staff meeting.

Under C we do not do anything. Under B we have classification. They may possibly have a nurses' training school or teach patients to a certain extent. In fact, I think they ought to use the patients and teach nursing to a certain extent. The special tuberculosis course would come in what you may call an A1 institution. It is a very difficult thing to handle.

There is a question that will likely come up about taking records—how long a history ought to take. Dr. Barnes and myself were on the committee some years ago to report on that, and you will find perhaps in the record where we went over it, how much work a man ought to put in and be required to give.

Dr. Barnes: I would like to say that I think that standard is too stiff.

The staff meeting is all right, but I do not think a sanatorium which has as its prime function the care and treatment of tuberculosis patients should be compelled to run a doctor's school in order to get into A class, and the head may not have any interne. I do not think he ought to be compelled to have special students. In order to get into A class, he would have to have instruction for the internes and special students. It seems to me that is far beyond the average state sanatorium, and not essential to the best work.

Dr. Brown: We will take out special students. Don't they teach the interne everywhere?

Dr. Barnes: We haven't any internes. If we haven't any, how can we teach them?

Dr. Brown: These items only apply to the A1 class.

Dr. Barnes: Under A there is a course for doctors and one for internes.

Dr. Brown: No, that is the nurses' training school. If you have internes or assistants, the man who does not try to help them along when they come in and don't know tuberculosis, is not doing his duty. If an institution does not do that they might as well not try to direct them at all.

Dr. Barnes: But must he keep internes if he doesn't need any?

Dr. Brown: They may be internes or assistants. I mean more the spirit of it than in actual course of instruction. In the same way I feel that the nurse who comes in ought to be helped too. I think everybody does that. You get your assistants and you tell them what to do here and there and you teach them in that way.

Dr. Barnes: Does that imply a course of training for the graduate nurses in addition to the training school?

Dr. Brown: No, this would imply a special tuberculosis course for physicians or for nurses. I then put down internes or assistants or the nurses who will be helped in their study of tuberculosis rather than meaning any special course.

I have felt that what we want to do all the time is to reach up for the ideal, not to class a man as low as you can, but put something ahead of him so that he can work up to it if he is any good. Constantly have someone go ahead of him because the man who goes alone usually is dead.

Dr. Wise: If you do not have any prescribed course for the teaching of internes in the institution, how are you going to determine the requirement? You say you understand now that most of these internes are getting adequate instruction. If you do not have the prescribed work, how could you determine it?

Dr. Brown: That I cannot tell you.

Col. Nichols: It is perfectly easy to have a standardized course and we have found it very necessary. I am a victim of standardization, and, for one, I am going to say that I am mighty glad to see this whole question of standardization taken up by this Association. I do not want the committee to feel discouraged about it. Some of you may feel that it is idealistic to a certain extent, but we are going to find that it will work out and it will prove to be one of the most practical things ever done in this

country. It can be done because it is being done in the Army. Medical men came into the service from all over the country. They had no uniformity in method, interpretation, nomenclature and treatment, and the first thing we discovered was that we could not do intelligent work and get results before everything was standardized, which was done by Washington. I believe that everything that has been suggested thus far can be accomplished and that the sanatoria can be standardized and graded according to whether they live up to the standard established for their particular kind of hospitals. The standards for county sanatoria may need to be different from state and private sanatoria. The standards for size may have to differ. That is, a hospital of 50 beds cannot be expected to have the same standards as a hospital of over 100 beds or a 100-bed hospital the same standards as a hospital of over 500 beds, or a 500-bed hospital the same standards as a 1000-bed hospital in its particular class. I will suggest that there be three classes of county sanatoria and three classes of state sanatoria according to size and that there be two classes of private sanatoria according to size.

I shall look forward to seeing all the work standardized so that results may be judged by comparison.

Dr. Brown: I would like to put in under "A" possibly a diagnosis clinic, not the cases themselves necessarily brought up, but the records brought up before the entire staff and passed upon by them. I feel it is a very important thing to make certain that correct diagnoses, or as correct a diagnosis as possible, are made, and that certain cases are not overlooked. We found before we had that, that cases would drag on for three or four months sometimes because of indefinite diagnosis.

Just one thing that comes under the heading Library. It seems to me to be a very good thing as a minimum for class A. Here is a list:

LIBRARY

1. *General:*
   - History of Medicine.
   - System of Medicine.
   - Practice of Medicine.
   - Textbook of Physiology.
   - Anatomy.
   - Pharmacology.
   - Bacteriology.
   - Pathology (Hiss & Zinsser, Parke & Williams).
   - Immunity (Zinsser).

2. *Journals:*
   - Journal of the American Medical Association.
   - American Review of Tuberculosis.
   - Journal of the Outdoor Life.
   - Beitraege zur Klinik der Tuberkulose (Brauer).
   - Zeitschrift für Tuberkulose.
   - Internationales Centralblatt f. d. gesamte Tuber-forsch.
   - La Presse Medicale.
   - British Medical Journal.
   - British Journal of Tuberculosis.
   - American Journal of the Medical Sciences.
   - American Journal of Public Health.
   - Index Medicus.
   - Quarterly Cumulative Index.

Review de la Tuberculose.
American Journal of Roentgenology.
Abstracts of Bacteriology.
Modern Hospital.
American Journal of Nursing.

3. *Books of Diseases of the Lungs:*
Babcock.
Powell & Hartley.
Wilson Fox.
Fraenkel (Pathologie und Therapie der Lungentuberkulose).
Laennec.
Lord.
Samuel West.
Fowler & Godlee.
Grancher.

4. *Books on Diagnosis:*
Riviere.
Hawes.
Gee (Auscultation and Percussion).
DeCosta.
Simon (Clinical Diagnosis).
Flint (Physical Diagnosis).

5. *Books on Tuberculosis:*
Bonney.
Pottenger.
Fishberg.
Klebs.
Arthur Latham.
Herard Cornil & Hanneau.
Turban.
Brauer, Schroeder & Blumenfeld.
Cornet.
Bandelier & Roepke.
Burton-Fanning.

6. *Books (Special):*
Tuberculin:
Riviere & Morland.
Hamman & Wolman.
Sahli.
Ghon.
Straus (Tuberculose et son Bacille).
Hamburger (Tuberculosis of Children).
Lockhart (Tuberculosis of the Nose and Throat).
Rolliere (Sun Treatment).
Bones and Joints:
Ely.
Senn.
Climate:
Haggard (Handbook of Climatic Treatment).
Ward (Climate).
Moore (Bovine Tuberculosis).
Alexander James (Pleurisy).
Bardswell & Chapman (Diets in Tuberculosis).
Knox (X-ray and Electro-therapeutics).
LaMotte (The Tuberculosis Nurse).

It takes up six groups of books. It contains standard books on diseases of the lungs, more or less general works, and then books on tuberculosis; books on special phases of tuberculosis, and various other things.

The President: I would suggest that if anybody has further suggestions, that they be submitted to the committee which I will appoint later. The last subject is the question of Results.

Dr. Brown: We discussed "Results" somewhat at Saranac, but it was rather as to whether it was possible to classify sanatoria according to the results they obtained. It is very difficult.

The President: How about giving the results after a certain number of years.

Dr. Brown: I should think under "Results" that it would be a very valuable thing to follow up a patient. Of course, there is always a fallacy in that, and that is that the patients from the poor are not going where those do that come from among the better classes. To that extent it would not be fair to compare the results obtained. A great many of our patients go back to fairly comfortable surroundings, and of course, they ought to do better than patients from some other institutions. All those factors should be brought out.

Dr. Emerson: There is just one thing I would like to ask,—that is the matter of scoring on this thing; working out the values of all these different items on the final score.

Dr. Brown: I have not given that much thought. It is a very important point. It appears to me the wise thing to do would be to appoint a committee which would formulate some plans, and if possible report to us at our next meeting in Atlantic City, and that this committee may be delegated to meet with the committee which has been appointed by the Mississippi Valley Sanatorium Association. Then, if we approve, the report of these two committees could go in to the National Association, and the National Association could bring the subject up and go over it. I do not think we want to go into it too hurriedly, and the reports of the committees should be published so every one could have access to them.

(It was moved and seconded that the president appoint such a committee.)

FOURTEENTH SPRING MEETING OF THE AMERICAN SANATORIUM ASSOCIATION

FOURTEENTH SPRING MEETING OF THE AMERICAN SANATORIUM ASSOCIATION

THE meeting was called to order, Dr. Lawrason Brown, vice-president, in the chair, at 10.30 A. M., at the St. Paul's Methodist Church, Atlantic City, June 14, 1919. There were present 84 members and guests.

The treasurer's report was offered showing a balance of 86 cents. The difference between this and the usual balance of one hundred or more dollars was due to the expense of recent meetings and of getting out the standardization report. It was suggested that a special assessment be levied, but the treasurer thought it was not necessary as the regular dues of one dollar per year were ordinarily ample and there were only a few outstanding small accounts. On report of the Auditing Committee, same was accepted.

The secretary's report showed the death of Dr. W. Donald Braislin of Trudeau Sanatorium and the resignation of Dr. Montgomery Leary of Rochester, New York, because of separation from sanatorium work. Applications for membership were received from:—

Dr. J. Stanley Woolley, Loomis (re-instatement).
Dr. Andrew Peters, Jr., Loomis.
Dr. Russell J. Collins, Camville, Nova Scotia.
Dr. James Burns Amberson, Jr., Loomis.
Dr. Henry H. Boswell, State Sanatorium, Mississippi.
Dr. G. Windesheim, Kenosha Sanatorium, Wisconsin.
Dr. B. R. Wakeman, Pleasant Valley Sanatorium, Bath, New York.

On motion all were elected and Dr. Leary's resignation accepted, giving a membership of one hundred ninety-eight.

The Nominating Committee was appointed by the chair, and reported the following nominations:

President, Dr. Lawrason Brown.
Vice President, Dr. A. M. Forster.
Secretary-Treasurer, Dr. Edward S. McSweeny.

For Honorary President, Dr. Vincent Y. Bowditch, he having declined a reëlection to the presidency in the following letter:

June 10th, 1919.

My dear Doctor McSweeny:

In retiring from the presidency of the American Sanatorium Association, I wish to express my deep appreciation of the pleasure and profit that I have derived in my ten years of service in the society of men who have been working with me and whose friendship I highly prize.

My interest in the Association will remain undiminished, but I feel it to be time for some one else to be at the helm. I can wish no greater good fortune to my successor than to have the privilege of presiding over an association which has brought so much good into my own life.

With my best wishes for the future welfare of the society, I am

Very sincerely yours,

(sgd.) VINCENT Y. BOWDITCH.

On motion the report was unanimously accepted and the candidates declared elected.

Dr. Brown made a few appropriate remarks thanking the Society for the honor conferred on him, and proposed spreading on the minutes some recognition of the services of Dr. Bowditch. On motion, a committee was appointed to draw up a suitable resolution and reported as follows:

"WHEREAS, Dr. Vincent Y. Bowditch has felt it necessary to resign as president of the American Sanatorium Association, a society which he helped to found and over which he has always presided, and

"WHEREAS, he holds with us a place second only to that held by Dr. Trudeau as a friend to the younger men in the sanatorium work and as an inspiration to their best efforts; be it therefore

"*Resolved*, that we tender him our sincere appreciation of all that he has done for the Association, and remind him that he can resign his office—not his place in the work of the Association or in the affection of its members; and be it

"*Resolved*, that the secretary be instructed to see that a copy of these resolutions be sent to Dr. Bowditch and that they be also printed in the transactions of the Association."

(sgd.) DAVID R. LYMAN,
JNO. J. LLOYD,
WALTER A. GRIFFIN.

Dr. Brown, as chairman, presented the report of the Committee on Standardization of Sanatoria, which had been printed and distributed to the members, noting at the same time the following amendments on behalf of the committee:

Before making any attempt to appraise the items listed, it may be wise to emphasize a few important details:

Location—to be rated on the basis of nearness to population, commercial and transportation centers, and transportation facilities for the institution.

Ice Supply—to read Water, Refrigeration and Ice Supply; volume and quality.

Sewage—Bacterial and Chemical Content of Effluent.

Administration—Classified Expenditures—subheadings:

Care of patients
Culinary
Domestic
Agricultural
Engineering
Buildings and Grounds

Travelling Expenses
Sanatorium Commission Expenses
Insurance
Increase in inventory

Your committee has met with Dr. Bosworth, representing the Committee of the Mississippi Valley Association, and offers as a part of its report the report of that committee as follows:

PRELIMINARY DRAFT OF COMMITTEE ON STANDARDIZATION OF TUBERCULOSIS SANATORIA OF MISSISSIPPI VALLEY SANATORIUM ASSOCIATION

1. Preliminary Organization and Supervision. It is recommended that the immediate Board of Trustees consist of five members, especially qualified to serve, appointed by the county board but not to include in its personnel members of county board. At least one member of the Board of Trustees should be a licensed physician. It is recommended that there should be central state supervision over the construction and equipment of sanatoria and over matters pertaining to general management.

2. Location and Site. (*a*) It is recommended that a site be selected bordering on the city limits, having in mind efficient transportation facilities such as trolley or railroad, also city sewerage, gas, electric light and telephone. Location selected several miles from the nearest center of population or transportation facilities is especially condemned.

(*b*) The character of surroundings should be free from objectionable features such as cemeteries, certain industrial occupations, etc.

(*c*) Sufficient property should be purchased to permit of proper location of buildings, provide recreation space for patients and the establishment, if possible, of a farm colony for ex-patients. The committee advise against the purchase of farm property making use of such with a view of producing an income for the institution through garden truck, etc., using patient labor. The establishment of a farm and dairy are not recommended. Small truck gardening and poultry establishments are permissible in connection with the industrial occupation department.

3. General Construction. (*a*) It is recommended that infirmary, or bed patients, be housed in two-story fire-proof buildings and that the administration building be also fire-proof. Ambulant patients may be housed in units of 16 in one-story buildings or 32 in two-story buildings, the central or administration portion being fire-proof where the buildings are two stories in height. Canvas construction is advised against.

Twenty per cent. of the total capacity of the institution should be specially arranged for the accommodation of acutely ill patients. Thirty per cent. of the total capacity should be arranged for the care of other advanced cases not acutely ill but still non-ambulant. Fifty per cent. of the capacity should be provided for ambulatory patients. Especially planned quarters for children should be provided for those acutely ill from tuberculosis classified as open cases. Separate quarters for

children should be provided for closed cases and for preventorium cases.

4. Special Construction. (*a*) It is recommended that each institution irrespective of size, provide a room or rooms for the physical examination of patients, consultations, nose and throat and other treatments, for laboratory use and where possible for x-ray. The committee especially recommend a completely equipped department for treatment of nose and throat conditions in all institutions. Every institution of 100 beds or more should be provided with a complete x-ray equipment.

(*b*) Special planning is necessary for the proper housing of staff and employes. A special building planned for each is best. If impossible to provide quarters in separate buildings they should be housed in wings not containing patients, but never in basement rooms. Nurses should be provided with pleasant, comfortable quarters in which the hospital or institution atmosphere is eliminated. A recreation or social room should be provided for nurses and also for employes in institutions employing either in any number.

(*c*) Recreation or social room should be provided for patients in all institutions. The committee is of the opinion that little has been done in the average sanatorium toward eliminating the institutional atmosphere so objectionable to patients whose residence is desirable for several months.

In small institutions provisions for industrial occupation or occupational therapy may in a limited degree be included in the recreation quarters.

In larger institutions special provisions should be made for the proper housing of the department of industrial therapy, a department which has its place and should be established in every sanatorium.

(*d*) In the opinion of the committee, staff dining rooms are not required or desirable in the smaller institutions. In the larger institutions where numbers of patients are cared for and where non-professional employes are present such as stenographers, clerks, bookkeepers, wives and children of staff, etc., it is wise to provide separate dining rooms from those used by patients.

Servants in all cases should have and use a separate dining room.

(*e*) A room should be provided for the care of the dead which can be reached by attendants with the least possible disturbance to patients, from which bodies can be removed readily and inconspicuously.

5. Medical, Nursing, etc. (*a*) The medical head of each sanatorium should be a specially trained expert in the institutional treatment and management of tuberculosis patients. He should devote his entire time to the affairs of the institution.

In instances where small sanatoria find difficulty in procuring expert medical services, the committee recommend the Minnesota plan of dividing the full time of one physician between two closely located sanatoria.

A resident physician should be provided for each fifty patients.

(*b*) A graduate nurse experienced in sanatorium methods should be in charge of the nursing department. A nurse should be maintained for

each ten patients in the institution. Non-graduate nurses may be employed under the strict supervision of a graduate nurse. The service of a night nurse should be available in every institution.

(*c*) Domestic staff—steward. It is desirable to procure the service of a steward in an institution of 75 patients and over. The steward should have charge of the purchase of food supplies and their storage, under the supervision of the superintendent. He should have active charge of the culinary department and all employes so engaged.

A housekeeper should be employed in an institution of 75 patients or over. In smaller institutions her duties can be performed by the head nurse.

6. Training School for Nurses. It is the duty of all large tuberculosis sanatoria to maintain training schools for nurses, if possible in coöperation with nearby general hospitals. Former patients whose physical condition warrants, may be admitted as student nurses.

7. Farm Colony. The committee desires to urge the establishment of farm colonies for the employment of ex-sanatorium patients, under proper supervision. The committee holds the view that one of the weakest links in the present campaign against tuberculosis is the management or lack of management of ex-patients, immediately after they are discharged from the sanatorium.

The waste of public funds may be in a large degree reduced by the avoidance of relapse in ex-patients, should they be given proper employment under strict and efficient supervision. The farm colony affords much of value towards solving this problem.

8. Patient Labor. While under treatment for active tuberculosis and before such degree of improvement has been attained to permit of occupation in the farm colony, patient labor as an economical consideration in the management of the sanatorium is strongly advised against. Occupational therapy under proper supervision for its psychic effect is approved.

9. Out-Patient Work. The establishment of free tuberculosis clinics and the maintenance of full time visiting nurse service, by means of which cases of tuberculosis may be discovered and admitted to the institutions, and discharged or ex-patients may be kept under proper supervision, is urged as a public health measure second to none in importance in our campaign against tuberculosis. This service should be directly a part of the activities of the sanatorium or in close coöperation with it.

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STANDARDIZATION OF SANATORIA

REPORT OF COMMITTEE

The committee appointed at the last meeting of the American Sanatorium Association begs to report that, in its opinion, standardization or grading of sanatoria is a feasible suggestion; it is a comparable task with the standardization of medical colleges, charitable institutions, and hospitals, all of which have been or are now being done.

That, in its judgment, such standardization or grading should be undertaken for the benefit of the public and the sanatoria. For the public, that they may have some authoritative opinion upon which to base their own judgment, in a matter of importance with which they are not sufficiently familiar, and because we believe this movement will eventually result in the discontinuance of sanatoria which do not maintain at least minimum standards. For the sanatoria, that each may have the advantage of full knowledge of the development of others, and argument and authority for its endeavors to improve itself.

We recommend, therefore, that the standardization and grading of the various sanatoria in accordance with the general plan outlined herewith, be suggested to the National Tuberculosis Association.

General Plan

Grading of sanatoria shall be undertaken by the National Tuberculosis Association, and all sanatoria shall be immediately notified thereof. The first provision standardization shall be made from unchecked reports returned by the sanatoria themselves on suitable forms. This standardization shall not be published, but later standardizations, based on such returns, checked as may be necessary to substantiate claims, shall be published in the Journal of the Outdoor Life.

All sanatoria falling below the minimum standard "C," as defined elsewhere, shall be rated "not qualified," or by some similar term. All other sanatoria shall be rated into classes "A," "B," and "C," without reference to their size or form of government. An additional rating may be granted institutions doing educational or research work.

All values, both as to quantity and quality, assigned to any item under any factor on which ratings may be made, shall be precisely stated, and the establishment of claims shall be based simply on questions of fact, and as little as possible be left to the discretion or opinion of those charged with the duty of inspection. Items which do not lend themselves to this restriction, shall not be included in the schedule. Ratings, and inspections when necessary, shall be made by a representative commission, and not by an individual.

Sanatoria shall be graded on the following factors:

	Weight
Location, etc.	3
Plant and Equipment	5
Administration	18
Medical	74
Total	100

There shall be prepared schedules under each factor (of which examples are herewith submitted), which shall include all items, that, in the judgment of the Rating Commission, are felt to have value in the standardization of sanatoria, subject to the restriction in paragraph three (General Plan). The items in these schedules shall be divided into three classes, C, B and A.

The average of the ratings of all the schedules under any factor shall be the rating of that factor, and the final grading shall be the sum of the percentages which these ratings are of the factor weights.

90 to 95, 80 to 89, 70 to 79 expressed as A, B, C

	Value
C. Those deemed essential for admission to standardization	70
B. Additional items which add to the sanatorium's usefulness	85
A. Such items of superiority as deserve special recognition	95

Factor—Location, Etc. *Schedule 1.*	Class	A Good	B Fair	C Poor
Nearness to population, commercial and transportation centres				
Water, volume and quality				
Ice supply (refrigeration), volume and quality				
Sewerage, bacterial and chemical content of effluent.				
Site and surroundings exposure, grading, dust, grounds, elevation,* noise, nuisances (cemeteries, factories, etc.)				

*(Altitude of no moment.)

Factor—Plant and Equipment *Schedule 1.*	Class §	A_1	A	B	C
Wards (100 sq. ft. per patient)		x	x	x	x
Rooms (100 sq. ft. per patient)		x	x	x	
Porches		x	x	x	x
Dressing rooms		x	x	x	
Emergency rooms		x	x		
Reception building		x	x		
Infirmary (20 per cent. of beds)		x	x		
Baths					
Handbasins 1 to 4 people (under 1 to 4)		x	x	x	x
Bath tubs 1 to 5 or (under 1 to 5)		x	x	x	x
Showers 1 to 10		x	x	x	
Tooth sinks 1 to 12		x	x	o	o
W. C. (toilets) 1 to 12 or				x	x
better 1 to 6		x	x		
Recreation building		x			
Chapel		x			
General library		x			
Workshop for patients					
† Dining room		Prime	Good	Fair	Poor
† Kitchen		"	"	"	"
Diet kitchen		x	x		
Cooler		x	x		
Ice plant or house		x	x		
Farm and barn		x	?		
Employes' quarters		Prime	Good	Fair	Poor
Heat and power plant		x	x	?	?
Medical staff's house		x	x		
Nurses' home		x	x		
Laboratory		x	x		
Animal house		?			
‡Medical library		x	x		
Laundry		x	x		
Upkeep buildings					
grounds		Prime	Good	Fair	Poor
equipment		"	"	"	"

† See Inspection Blank, New York City Health Dept. (Appendix B).
‡ See Appendix C.
§ See last sentence, paragraph two, General Plan.

Factor—Administration	Class	A_1	A	B	C
Schedule 1.			Good	Fair	Poor
Board of managers			"	"	"
Cleanliness of buildings			"	"	"
Accounting					
* Sources of income					
* Classified expenditures					
* Per capita costs					
* Annual report					
Transportation			"	"	"
Organization and management of employes			"	"	"
Purchasing efficiency			"	"	"
Salaries and wages (vary with locality)			"	"	"
Schedule 2.					
Staff					
Superintendent		x	x	x	x
Superintendent Assistant		x			
Bookkeeper		x	x		
Cashier		x			
Stenographer		x			
Steward		x	x		
Housekeeper		x	x		
Engineer		x			
Chef		x	x	x	x
Baker		x	x		
Farmer		x			
Laundryman		x	x		
Outside Foreman		x	x		
Maids		x	x	x	x
Laborers		x	x	x	x

* Care of patients, culinary, domestic, agricultural, engineering, buildings and grounds, travelling expenses, sanitary commission expenses, insurance, increase in inventory.

Factor—Medical	Class	A_1	A	B	C
Schedule 1.					
Professional staff					
Resident physician		x	x	x	
Assistant physician (one for every 30 patients—over 30)		x	x	?	
Radiographer		x	x		
Laboratory man		x	x		
Head nurse		x RN	x RN	x	x
Assistant nurse (one for every 10 patients)		x	x		
Statistician		x			
Dentist		x			
Druggist		x			
Dietitian		x			
Vocational instructor		x			
Medical stenographer		x			
Research workers		x			
Attending physicians					x
Consulting physicians					
Sanitary commissioner					
†Value to community		x	x	?	?

†*Health:* Do not expect ill man to do well man's work.
Recreation: Must have opportunity to play in order to work well.
Personnel of Staff and team work most important.
Difference between A_1 and A is that former is over-staffed, and so can do original research work.

Schedule 2.

Medical Work. Class	A_1	A	B	C
History	x	x	x	x
P. E.	x	x		
Chest examination	x	x	x	x
Routine laboratory	x	x (S. & U.)	x	x (S. Diag.)
Routine x-ray	x	x	x	
	Stero	Stero	Flat	Fleuroscopic
Routine dental	x	x		
Special Diagnosis	x	x		
Tuberculin	x	x		
Serologic	x	x		
Bacterial	x	x		
Special tests	x	x		
Goetsch	x	x		
(See care of patient)				
	A_1	A	B	C
Subsequent history	x			
Research	x			
Routine medical work				

History: 10–15 minutes on special blanks.
P. E.: Full notes on upper resp. tract; brief notes on glands, skin, abdomen, heart, and possibly blood.
Lungs: Chart on admission and discharge or at each exam.; every two months if doing well; every two weeks if doing badly.
Inspect: General shape, shoulders, clavicles pectorali, interspaces, movement.
Palpitation: V. F., movement, state of muscles.
Perc.: in well marked disease, Kroenigs, and basal movements may be omitted. (bg).
Auscultation: Bg. V. F., rales on (cg.) on (inspiration, expiration).

Anat.: Diag.

NOTE.—"Medical work," Routine Laboratory S. and U., refer to sputum and urine.
Schedule 2.—S. Diag. means sputum examined for diag. only. At the bottom of this section are footnotes intended as suggestions.
Final abbreviations mean "anatomical diag."

Schedule 3.

Records Class	A_1	A full detail	B full blank	C brief
History				
Physical examination		x		
Chest examination		x	x	x
Chest graphic		x	x	x
Lab. record		x	x	
X-ray record		x		
Special record		x		
Running history record		x	x	
Weight chart		x		
Temperature chart		x	x	
Diagnostic chart		x		
Application blank		x	x	x
Financial statement of patient		x	x	x
San. rules signed by patient		x	x	x
Exercise chart		x		
Patient discharge record		x		
*Annual medical report		x	x	x

*Annual medical report must contain at least record of all patients over thirty days, stage of P. S. and symptoms on admission and discharge, Turban, length of residence (average?).

Schedule 4.

Laboratory	Class	A_1	A	B	C
Sputum		x	x	x	x
Urine		x	x	x	x
Blood		x	x		
Bacteriology		x	x		
Serology		x			
Animal inoculation		x	x		
Research		x			

For Laboratory equipment see Baldwin—JOURNAL OF OUTDOOR LIFE, 1918 equipment good for "A"

Schedule 5.

X-ray	Class	A	B	C
Fluoroscopy		x	x	o
Radiography				
Lungs		x	?	o
Flat		x	?	
Stero		x		
General		?		

Importance:

1. Diagnosis demands x-ray in many cases
2. Classification will demand x-ray in future
3. In view of lack of post mortems and more particularly in view of lack of autopsies, repeated on same cases at stated intervals, radiographic biopathology most important for careful study.

Schedule 6.

	Class	A_1	A Excellent	B Fair	C Indefinite
Care of patient:					
Medical supervision (general)					
Instruction of patient (general and individual)			x		
Special treatment			x		
Artificial pneumothorax			x	x	
Light			x		
X-ray			x		
Tuberculin			x		
Vocational			x		
Infirmary			x *(20%)	x (10%)	?
Single rooms			x	x	?
Diet			x	?	

*20 per cent. of beds can be used for infirmary purposes.

Nursing work			Good	Fair	?
Follow up work			"	x	x
Food			x	?	
			Good (variety.)	Good	?
Hygiene					
Cleanness building			x	x	x
Cleanness patient			x	x	x
Cleanness clothes			x	x	x
Sputum—care of			x	x	x
Fresh air			x	x	?
Discipline			Good	Fair	Poor
Housing of patient					
Room			"	"	"
Porch			"	"	"
Bath and dressing rooms			"	"	"
Regulation of rest and exercise			x	x	?
Regulation of fresh air			x	x	?

Schedule 7.

Instruction for physicians and nurses	Class	A_1	A	B	C
Staff meeting		x	x	x	o
Diagnostic clinic		x	x		o
Medical journal club		x	?		o
Interne instruction		x	x	?	o
Special students		x			o
Special tuberculosis course		x			o
Nurses' training school		x	?	?	o
Nurses' instruction		x	x	?	o
		100	90	80	

For those who do not think the various schedules under this factor should have an equal rating, the following values are suggested:

Professional staff	10
Medical work	10
Medical records	5
Laboratory	4
X-ray	4
Care of patients	40
Instruction of { nurses / physicians }	1

Appendix A

Character of Work and Number on Staff Required in Tuberculosis Sanatoria of Various Capacities

Number of patients to be cared for	20	30	40	50	60	70	80	90	100	125	150
Superintendent										1	1
Head physician	1	1	1	1	1	1	1	1	1	1	1
Assistant physician					1	1	1	1	1	1	1
Pharmacist					1	1	1	1		1	1
Laboratorian									1	1	1
Bookkeeper and stenographer	1	1	1	1	1	1	1	1	1	1	1
Matron						1	1	1	1	1	1
Head nurse	1	1	1	1	1	1	1	1	1	1	1
Nurses	2	3	4	5	6	7	8	10	12	15	18
Cook	1	1	1	1	1	1	1	1	1	1	1
Kitchen helpers	1	1	2	3	3	3	3	3	3	4	4
Waitresses		1	1	2	2	2	2	3	4	5	5
Maids			1	1	2	2	3	3	3	4	5
Orderlies						1	1	1	1	2	3
Handy man	1	1	1	1	2	2	2	2	2	2	2
Laundry man	1	1	1	1	1	1	1	1	1	1	1
Laundresses	1	1	1	2	2	2	3	3	3	4	4
Janitor			1	1	1	1	1	1	1	1	1
Engineer							1	1	1	1	1
Chauffeur						1	1	1	1	1	1
Stable men											
Gardener											
Farmer								1	1	1	1
Farm hands											1
Totals	10	12	16	20	24	28	32	36	40	50	56

Jas. D. Burt,
N. Y. State Dpt. Health.

Appendix B

See Report of Inspection of Restaurant, Hotel, Lunch Room, Saloon, Cafe.—Issued by Department of Health—Bureau of Food and Drugs, New York City.

Appendix C

Text Books

See Minutes of Meeting, June 14, 1919.

Appendix D

Complete Roentgen Equipment for Chest Diagnosis

Transformer	$900.00
Auto-timer	25.00
Coolidge tube unit	100.00
Coolidge tube	125.00
Stereographic tube stand	175.00
Stereographic vertical plate changer	125.00
*Fluoroscope	250.00
Stereoscope	100.00
†Two intensifying screens	125.00
Photographic outfit	75.00

* There are various fluoroscopic apparatus on the market varying in price from $250 to $600. However, an efficient apparatus for chest work mainly can probably be built for less than $250.

† Intensifying screens are not absolutely necessary in chest work.

Approx.	$2000.00

Single Plate Roentgen Equipment, for Chest Diagnosis.—B.

Transformer	$900.00
Coolidge tube unit	100.00
Coolidge tube	125.00
Tube stand	75.00
Fluoroscope (See note above regarding fluoroscope)	250.00
Accessories and photographic outfit	100.00
Approx.	1550.00
Stereographic plate examination (chest) approximate cost	2.00
Single plate examination	1.00

*Complete Diagnosis Roentgen Equipment.—**A1.*

Transformer	$1200.00
Auto-timer	50.00
Coolidge tube unit	125.00
Three Coolidge tubes	375.00
One stereographic tube stand	175.00
Stereographic vertical plate changer	150.00
One tilt table for fluoroscopic and radiographic work in both vertical and horizontal positions, or separate units for vertical and horizontal work	1200.00
One stereoscope	150.00
Intensifying screens	200.00
Accessories	200.00
Photographic outfit	200.00
Note.—It is quite possible to modify the above equipment and still keep it as efficient.	
Approx.	$4000.00

Before the discussion was opened, the chairman called on Dr. Pattison of the National Tuberculosis Association to tell the members how the idea of standardization had its inception, and why it seemed a wise thing to take up at this time. The report was then summarized by the secretary, and the society proceeded to discuss it. The various factors with their weights and the schedules of items under each, with their proposed values, were entered on the blackboard and taken up in turn. On behalf of the committee, Dr. Brown explained the reasons for each paragraph and rating, accentuating that the objects in mind at all times had been:

1. To classify existing sanatoria rather than to furnish specifications for the location, erection or organization of new institutions.

2. To be helpful in giving to every superintendent argument for funds

or authority to improve his sanatorium rather than to distinguish some or disparage others.

3. To set fairly high goals, which all would seek to attain, thus stimulating improvement.

He explained that the appendices were suggestive only, noticeably the x-ray prices.

He expressed the committee's complete open-mindedness as to amendment and invited a full discussion, stressing the point that no matter what basis of standardization was arrived at, the idea was to have each sanatorium classify itself the first year without checking, and that no publicity was to be given to this classification, and that after this experience, it was hoped all the sanatoria would agree on some mutually satisfactory scheme for classification which could then be proceeded with by the National Association and the results made public.

Doctors Brown, Forster, Pattison, Heise, McSweeny, Wilson, Holden, Nichols, Rosenberg, Coon, Rutledge, Lyman, Stewart, English, Kibbe, Zueblin, Bosworth, Howk, Sampson, and Wise took part in the discussion. As much of it was question and answer and a repetition of that at the last meeting, it was thought not necessary to print it all. The main points brought out were:

First, that it would be wiser to state the standard attained for each factor separately, having the items under each factor make up in the aggregate 100 per cent., and rating the fact on that basis. Contrary objection was offered that this would not make it possible to rate the sanatoria by one term, such as A, B, and C, as had been done with the Medical Colleges, and that, moreover, it would create a false impression that the Sanatorium Association felt that the value of the factors was equal.

Second, it was suggested that the values assigned to factors be revised, raising those assigned for plant, equipment and location, and correspondingly reducing the value assigned to the factor—medical.

Third, that the item LOCATION be not considered in assigning value as the study was of present institutions already located.

Fourth, that the items LOCATION, PLANT, and EQUIPMENT be omitted, and the standardization based purely on medical work.

Fifth, that all items coming under equipment be classed under the factor—medical.

Sixth, that the grade of A1 be omitted as tending to create false and unfair distinctions between institutions because of the fact that those which were carrying on research and educational work were doing so for the most part with endowments or special funds not available to public institutions, and that this grade, while originally appearing in the American Medical Association's Classification of Colleges, had been dropped.

Seventh, that x-ray work, no matter where done, would be given the same credit as if the x-ray work were done in the institution.

Eighth, that the same consideration would apply to laboratory or other work which could be done out of the sanatorium.

Ninth, that for Grade C, the physician need not be an actual resident

of the sanatorium if in regular attendance and medical care was available in emergency.

It was finally moved by Dr. Lyman and seconded by Dr. Heise that the committee's report be accepted; that the committee be instructed to prepare a form of report in accordance with it and send the same to each sanatorium represented in the membership, requesting that it be filled out and returned to the secretary; that these self ratings be not published, but made the basis for a discussion at the next annual meeting, and that no recommendation be made to the National Tuberculosis Association until after that meeting.

An amendment was offered by Dr. Wilson that the committee confer with the joint committee of the American College of Surgeons, the American Medical Association, the American Hospital Association, and the National Nursing Association, which is to consider standardization of hospitals, requesting them to leave the rating of the tuberculosis sanatoria to the National Tuberculosis Association.

An amendment was offered by Dr. Brown that the National Association be recommended to appoint a committee on sanatorium construction to draw up standards of construction, and to revise the same at least every three years.

On motion the meeting adjourned.

National Tuberculosis Association

BY-LAWS

LIST OF MEMBERS

October 1, 1919

BY-LAWS OF NATIONAL TUBERCULOSIS ASSOCIATION*

Article I—Name

The name of this Association shall be National Tuberculosis Association.

Article II—Seal

The seal of this corporation shall consist of a flat-faced circular die, with the words and figures, "National Tuberculosis Association, Corporate Seal, 1918, Maine," cut or engraved thereon.

Article III—Membership

The members of this Association shall consist of four classes: (a) Members; (b) Life Members; (c) Corporate Members; (d) Honorary Members.

(a) The persons who made application, dated September 6, 1918, for the incorporation of this corporation shall be members without payment of dues until the annual meeting of the members to be held in 1919, and all persons who are members in good standing on September 25, 1918, of the voluntary association known as National Tuberculosis Association as shown by the Membership Ledger of said voluntary association now in the possession of the Managing Director of said voluntary association, shall be members of this corporation with dues paid up to the time to which their respective dues in said voluntary association are paid up, and such members as shall from time to time be approved by the Executive Committee shall be members of this corporation. The dues of members shall be $5.00 a year.

(b) Members may become Life Members upon the payment of $200.

(c) Anti-tuberculosis associations, sanatoria, dispensaries, open-air schools and similar agencies, libraries and industrial and other corporations may be members, with the approval of the Executive Committee, on payment of $5.00 or more per annum.

(d) Persons distinguished for original researches relating to tuberculosis, or eminent as sanitarians or as philanthropists who have given material aid in the study and prevention of tuberculosis may be elected Honorary Members by the Board of Directors.

Any member failing to comply with the provisions of the By-Laws of this corporation shall thereupon cease to be a member.

*As adopted at the Incorporation Meeting of the Association, September 25, 1918.

Article IV—Board of Directors

Section 1. The Board of Directors of this corporation shall consist of seven members until otherwise fixed by a vote of the members of the corporation, when it shall be fixed at sixty members, divided into five classes of twelve members each. When the number of Directors is so fixed at sixty members, the Directors first elected shall be elected for terms to expire respectively at the first, second, third, fourth and fifth Annual Meetings of the Members thereafter; and at each Annual Meeting to be held thereafter a class of twelve Directors shall be elected by ballot from the members for a term of five years to succeed the class of twelve Directors whose term then expires. Retiring Directors who have served a full term of five years shall not be eligible for reëlection the year of retirement.

At least one-third of the total number of Directors shall consist of laymen. The Board of Directors may, at its discretion, fill any or all vacancies caused by death, removal, resignation or otherwise of any of its members for the unexpired term at a regular meeting of the Board provided that written notice specifying the vacancies to be filled be given in hand or mailed to each member of the Board at least twenty days in advance of the meeting.

Section 2. Except as otherwise provided in these By-Laws, the Board of Directors shall have entire charge and control of the business and property of the corporation, the planning of the work, the fixing of the time and place for the annual or special meetings of the members to be held in the State of Maine for the election of Directors or for any other purpose and the arrangements for congresses, legislation and all other matters pertaining to its affairs.

Section 3. The Board of Directors is empowered to appoint representatives on national or international committees or other agencies that deal with tuberculosis or public health work. It shall also from time to time appoint such committees as may be necessary for scientific, charitable and educational work and for the holding of meetings and congresses.

Section 4. Seven Directors shall constitute a quorum.

Article V—Officers

Section 1. The officers of the corporation shall be a President, two Vice-Presidents, a Secretary, a Treasurer, a Clerk and such other officers or agents as the Board of Directors may from time to time elect. All of the officers of the corporation, with the exception of the Clerk, shall be elected annually by the Board of Directors. The Directors and the Clerk shall be elected annually by the members. The President must be a member of the Board of Directors. The other officers may be, but need not be, members of such Board.

Section 2. All officers shall perform the duties commonly incident to their respective offices and shall perform such other duties and have such other powers as are prescribed by these By-Laws or as the Board of Directors or the Executive Committee shall from time to time designate.

The Secretary, or in his absence, a Secretary pro tempore, shall keep correct minutes of all meetings of the Board of Directors and of the Executive Committee.

The Clerk, or in his absence, a Clerk pro tempore, shall keep correct minutes of all meetings of the members.

The Clerk or Clerk pro tempore shall be sworn to the faithful performance of his duties.

Article VI—Executive Committee

There shall be an Executive Committee, composed of the President and Secretary ex officio and seven members of the Board,—the latter to be elected annually by the Board, which committee shall exercise all the powers of the Board of Directors when the Board is not in session and such powers as are conferred by these By-Laws.

Article VII—Meetings

Section 1. *Meetings of Members.* A meeting of the Members of the corporation shall be held annually at the office of the corporation in Portland, Maine, at such time as may be fixed by the Board of Directors or by the Executive Committee. Special meetings of the Members shall be held at said office of the corporation when so ordered by the Board of Directors. Notice of the time and place of all meetings of the Members, and in the case of special meetings of the business to be transacted, shall be published by the Clerk once, at least, seven days* before the meeting, in some newspaper published in Portland, Maine. Each Member, Life Member and Corporate Member shall be entitled to one vote. Members and Life Members may vote at meetings either in person or by written proxy. Corporate Members may vote by their duly authorized representatives or such representatives' proxy in writing. Ten members entitled to vote, present either in person or by proxy, shall constitute a quorum.

Section 2. *Meetings of the Board of Directors.* Regular meetings of the Board of Directors shall be held in such places and at such times as the Board may by vote from time to time determine; and if so determined no notice thereof need be given. Special meetings of the Board of Directors may be held at any time or place whenever called by the President, reasonable notice thereof being given to each Director, or at any time without formal notice provided all the Directors are present, or those not present have waived notice thereof in writing. Such special meetings shall be held at such times and places as the notice thereof or waiver shall specify.

Section 3. *Meetings of the Executive Committee.* The Executive Committee shall hold meetings when called by the President.

Article VIII—Moneys

Moneys received from membership dues and from all other sources shall be used for defraying the expenses of the corporation and furthering

*As amended November 14, 1918.

its objects under the direction of the Board of Directors. The Treasurer shall keep proper accounts of all receipts and disbursements, which accounts shall be subject to the supervision of the Board of Directors.

Article IX—Amendment of By-Laws

These By-Laws may be altered, amended or repealed by a two-thirds vote of the members of the Board of Directors present at a meeting of the Board, provided that the proposition to amend has been presented in writing at a previous meeting of the Board and that subsequent to such presentation twenty days' notice in writing has been given of the proposed amendment in the call for the meeting.

GEOGRAPHICAL LIST OF MEMBERS

LIFE MEMBERS

Barrell, Finley, Chicago
Blumenthal, George, New York
Clark, F. A., New York
Fisk, Harvey Edward, New York
Frick, Henry C., New York
Harkness, Edward S., New York
Harris, Emma Gale, Chicago
Higginson, Henry L., Boston
Knickerbacker, Mrs. H., New York
Knopf, Dr. S. Adolphus, New York
Larsen, Ejnar, Wayne, Neb.
Lea, Henry C., Philadelphia
Lewisohn, Adolph, New York
McCormick, Cyrus H., Chicago
Macy, V. Everit, New York
Maloney, Martin, Philadelphia
Marshall, Louis, New York
Mather, Samuel, Cleveland
May, Francis E., Chicago
Phipps, Henry, New York
Rockefeller, John D., New York
Schiff, Jacob H., New York
Swift, L. F., Chicago
Wanamaker, Rodman, Philadelphia
Warburg, Felix M., New York

GEOGRAPHICAL LIST OF THE MEMBERS OF THE NATIONAL TUBERCULOSIS ASSOCIATION OCTOBER 1, 1919

ALABAMA

Alabama Anti-Tuberculosis League, 308 North 21st Street, Birmingham
Allen, Wm. B., 1314 Waucoma Street, Birmingham
Baker, Dr. J. N., Montgomery
Calhoun County Anti-Tuberculosis League, Anniston
Carrington, Mrs. J. B., 1030 Christine Avenue, Anniston
Cary, Dr. C. A., Alabama Polytechnic Institute, Auburn
Community Improvement Association, Five Points
Conn, Dr. Caroline C., 1212 Quintard Avenue, Anniston
Dowe, Miss Lucy, Secretary, Montgomery Anti-Tuberculosis League, 405 Bell Building, Montgomery
Eaves, Rev. George, D.D. Secretary, Alabama Anti-Tuberculosis League, 308 North 21st Street, Birmingham
Howze, Mrs. Henry R., 1218 Waucoma Avenue, Birmingham
Lewy, Miss Pauline, 408 Bell Building, Montgomery
Lull, Dr. Cabot, Birmingham
McCall, Dr. Daniel T., Mobile
Wilson, Dr. C., 1107 South 20th Street, Birmingham

ARIZONA

Babbitt, David, Flagstaff
Berry, Guy T., Tucson
Brown, Dr. O. H., 219 Goodrich Building, Phoenix
Bryan, Dr. W. G., Box 1192, Bisbee
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